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ATLANTIC COAST

PART V

From New York to Chesapeake Bay Entrance

SECOND EDITION (REPRINT WITH SUPPLEMENT)

PRICE, 50 CENTS

WASHINGTON
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1901

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UNITED STATES
COAST AND GEODETIC SURVEY OFFICE,

WASHINGTON, D. C., *March 25, 1898.*

This volume covers the coast from New York to Chesapeake Bay entrance, including Hudson River, Delaware Bay and River, and the inlets along the coast between Sandy Hook and Cape Charles.

This publication is based mainly upon the work of the Coast and Geodetic Survey, including the results of special examinations and investigations carried on in connection with its preparation.

The system adopted in this publication includes—

I. A tabular description of all lighthouses, light-vessels, and fog signals; lists of life-saving stations, Weather Bureau wind signal display stations, and seacoast telegraph stations; and information regarding tides, tidal currents, variation of the compass, etc.

II. General information concerning the several bodies of water and harbors, including notes relative to pilots and pilotage, towboats, depth of water, draft of vessels entering, harbor and quarantine regulations, supplies, facilities for making repairs, usual or best anchorages, and other matters of practical interest. In each case the information of this nature precedes the sailing directions and is printed in smaller type.

III. Sailing directions, with subordinate paragraphs treating of prominent objects, dangers, aids to navigation, etc. In the arrangement adopted the aim has been to conform, as far as practicable, to the order in which these matters would be considered in practice, and to render available such information as may be wanted promptly. For this purpose, and to afford a ready means of reference from one part to another, the sailing directions, where long, are divided into numbered or lettered sections, printed in large type, each followed by its own subordinate remarks in smaller type.

IV. Appendices.

The first edition of this volume was prepared by Lieut. Edwin H. Tillman, U. S. N., assisted by Mr. John Ross. In the present (second) edition the text has been revised and brought up to date by Mr. John Ross, under the general direction of Lieut. Commander E. D. Taussig, U. S. N., Hydrographic Inspector Coast and Geodetic Survey, and Lieut. J. C. Gillmore, U. S. N., Ass't, Coast and Geodetic Survey.

The aids to navigation are correct to March 25, 1898.

As absolute accuracy in a work of this class is scarcely possible, navigators will confer a favor by notifying the Superintendent of the Coast and Geodetic Survey of errors which they may discover, or of additional matter which they think, for the good of mariners, should be inserted.

HENRY S. PRITCHETT,
Superintendent.

UNITED STATES
COAST AND GEODETIC SURVEY OFFICE,

WASHINGTON, D. C., *December 19, 1900.*

The present volume is a reprint of the edition (second) of 1898. The supplement accompanying the volume gives information received, and notes the more important corrections and additions necessary to December 19, 1900.

O. H. TITTMANN,
Superintendent.

U.S. Doc.
32790

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1901

NOTE.

All bearings and courses are *magnetic.*

All distances are in *nautical miles.*

Except where otherwise stated, all depths are at *mean low water.*

In winter when whistling buoys, bell buoys, lighted buoys, can buoys, and nun buoys are in danger of being carried away by ice, they are taken up and replaced by spar or spar-shaped buoys.

SYSTEM OF BUOYAGE ADOPTED IN UNITED STATES WATERS.

The following order is observed in coloring and numbering the buoys in United States waters, viz:

1. In approaching the channel, etc., from seaward, RED BUOYS, with EVEN NUMBERS, will be found on the STARBOARD side of the channel, and must be left on the STARBOARD hand in passing in.

2. In approaching the channel, etc., from seaward, BLACK BUOYS, with ODD NUMBERS, will be found on the PORT side of the channel, and must be left on the PORT hand in passing in.

3. BUOYS painted with RED and BLACK HORIZONTAL STRIPES will be found on OBSTRUCTIONS, with channel ways on either side of them, and may be left on either hand in passing in.

4. BUOYS painted with WHITE and BLACK PERPENDICULAR STRIPES will be found in MID-CHANNEL and must be passed close-to to avoid danger.

All other distinguishing marks to buoys will be in addition to the foregoing, and may be employed to mark particular spots, *a description of which will be given in the printed list of buoys.*

Perches, with balls, cages, etc., will, when placed on buoys, be at turning points, the color and number indicating on what side they shall be passed.

Nun buoys, properly colored and numbered, are usually placed on the starboard side, and can buoys on the port side of channels.

Day beacons, stakes, and spindles (except such as are on the sides of channels, which will be colored like buoys) are constructed and distinguished with special reference to each locality, and particularly in regard to the background upon which they are projected.

Wherever practicable, the towers, beacons, buoys, spindles, and all other aids to navigation, are arranged in the list in regular order *as they are passed by vessels entering from sea.*

The positions of the buoys enumerated in this list are shown on the charts of the United States Coast and Geodetic Survey, which are kept corrected from information furnished by the Inspectors of the Lighthouse Districts, for the changes in the aids to navigation rendered necessary from time to time to indicate the best channels.

The following symbols and abbreviations are used on the charts of the Coast and Geodetic Survey:

- Red buoys, with even numbers, to be left on starboard hand in entering.
- Black buoys, with odd numbers, to be left on the port hand in entering.
- Black and white perpendicular stripes, without numbers, mid-channel or fairway buoys.
- or H. S., red and black horizontal stripes, without numbers, marking dangers or obstructions, to be left on either hand.
- Lighted buoys, different colors as above.
- ***WHISTLE,*** whistling buoys, different colors as above.
- ***BELL,*** bell buoys, different colors as above.

C., N., or S. signifies can, nun, or spar buoy.

U.S. COAST AND GEODETIC SURVEY

T. C. Mendenhall, Superintendent

INDEX TO PUBLISHED CHARTS

NEW YORK BAY

TO

CHESAPEAKE ENTRANCE

1894

GEODETIC SURVEY

ll, Superintendent

BLISHED CHARTS

'ORK BAY

TO

KE ENTRANCE

1894

37°

74°

AGENCIES ON THE ATLANTIC AND GULF COASTS FOR THE SALE OF THE CHARTS, COAST PILOTS, AND TIDE TABLES OF THE UNITED STATES COAST AND GEODETIC SURVEY.

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TREASURY DEPARTMENT

ATLANTIC COAST

BLOCK ISLAND TO CURRITUCK

PART OF CHART A

Scale 1:200 000

Nautical Miles

10 8 6 4 2 0 10 20 30 40 50 60

76° 75° 74° 73° 72°

41° 40° 39° 38° 37°

NEW YORK

CONNECTICUT

LONG ISLAND

NEW JERSEY

DELAWARE BAY

MARYLAND

VIRGINIA

NORTH CAROLINA

New Haven

New London

Fishers I.

Block I.

Gardiners I.

Montauk Pt.

Stratford Shoal

Cerberus Shoal

Race

Plum I.

Valiant Rock

Block I. East Ground

Cox Ledge

Watch Hill

Point Judith

Currituck

Sandy Hook

Cholera Bank

Five Fathom Bank

Fenwick I. Shoal

Great Gull Bank

Little Gull Bank

Winter Quarter Shoal

Brigantine Shoals

Purpoise Banks

Parramore Bank

Little Machipongo Inlet

Great Machipongo Inlet

Ship Shoal Inlet

Metomkin Inlet

Wachapreague Inlet

Little Egg Inlet

Great Egg Inlet

Corsons Inlet

Townsends Inlet

Hereford Inlet

Absecon Inlet

Brigantine Inlet

Barnegat Inlet

Tucker Beach

Ludlam Beach

Cape May

Cape Henlopen

Cape Charles

Cape Hatteras

Fenwick

Assateague

Hog

Overfalls

Bandy Hook

Fire Island

Shinnecock Bay

Great South Bay

Jersey City

Brooklyn

Staten I.

New Brunswick

Navesink

Sea Girt

Trenton

Philadelphia

Wilmington

Havre de Grace

Del. & Ches. Canal

Delaware & Raritan Canal

Baltimore

Annapolis

Chesapeake Bay

Potomac R.

Rappahannock R.

York R.

James R.

Elizabeth R.

Albemarle & Ches. Canal

Dismal Swamp Canal

Pasquotank R.

Roanoke R.

Albemarle Sd.

Pamlico Sd.

Hampton Roads

Portsmouth

Norfolk

Suffolk

Virginia Beach

False Cape

Currituck

Chincoteague Bay

Assateague I.

Currituck Beach

Fishers I.

Block I.

Montauk Pt.

Gardiners I.

Plum I.

Valiant Rock

Cerberus Shoal

Stratford Shoal

Race

Block I. East Ground

Cox Ledge

Watch Hill

Point Judith

Currituck

MAGNETIC COMPASS

VAR. 15° W. IN 1900 ANNUAL INCREASE 3'

TRUE COMPASS

20 fathoms

30 fathoms

40 fathoms

50 fathoms

100 fathoms

500 fathoms

1000 fathoms

UNITED STATES COAST PILOT.

ATLANTIC COAST—PART V.

NEW YORK TO CHESAPEAKE BAY ENTRANCE.*

General Remarks.—This volume, Part V of the "United States Coast Pilot, Atlantic Coast," covers the coast from New York to Chesapeake Bay Entrance, including Hudson River, Delaware Bay and River, and the inlets along the coast from Sandy Hook to Cape Charles. The coast from Point Judith, R. I., to New York, including Long Island Sound and the south shore of Long Island, is covered by Part IV, and Chesapeake Bay and tributaries by Part VI.

The coast from Sandy Hook to Cape Charles consists almost entirely of low sand beach, backed in many places by marsh and dark thick woods and has no marked natural features which can be recognized from seaward by the mariner. It is broken by one important body of water—Delaware Bay—which is the approach to the port of Philadelphia and the cities of Wilmington and Chester, and by numerous small inlets, the entrances of which can not be seen from seaward unless approached quite closely, and are navigable for small craft only. The hydrography along this coast is irregular, there being many outlying shoals with deeper water between them and the shore, and soundings taken are of but little assistance to the navigator in determining his distance from the shore.

For a stranger approaching this coast to the southward of the Highlands of Navesink, there are no prominent landmarks which can be readily recognized. The lighthouses and light-vessels form the guides in approaching or running along the coast, and are sufficiently numerous to make navigation along it easy in clear weather. The large number of vessels, engaged in the coasting trade, standing up and down this coast make it probable that any vessel approaching from seaward will be apprised of her approach to the land by the number of sail sighted.

The principal dangers which menace navigation are the outlying sand shoals, the doubtful direction and velocity of the currents after heavy gales, and fogs. The shoals are described under the sailing directions.

Anchorages.—Between Sandy Hook and Cape Charles the only sheltered anchorages available for vessels of over 6 feet draft in easterly gales is inside Delaware Bay entrance, either behind Delaware Breakwater, or in the entrance of the Delaware River. The inlets along the coast can not be entered on account of the heavy sea which breaks on the bars at their entrances.

Fogs are most frequent during the months of March and April, but may be met with at other times during the year; easterly winds bringing them and westerly winds clearing them away.

Ice rarely interferes with navigation along this coast, but in severe winters may in Delaware Bay form a serious obstacle to navigation.

Pilots will usually be found cruising off the entrance to New York and in the entrances to Delaware and Chesapeake bays. In fine weather local pilots for the inlets along the coast can usually be had from some of the Life-Saving Stations in the vicinity, or by lying off the entrances with signal set. Pilot laws and rates of pilotage are given in Appendix I.

Towboats will frequently, in summer, be met cruising between Sandy Hook and Barnegat, and occasionally off the entrances to Delaware and Chesapeake bays. The towboats from the port of New York go much farther to sea in search of tows than those of Delaware and Chesapeake bays.

Quarantine.—There are national quarantine stations at Delaware Breakwater, Reedy Island, and Chesapeake Bay entrance, and State quarantine stations at New York and Philadelphia. See Quarantine, Appendix I and Appendix III.

U. S. Marine Hospital Service regulations are given in Appendix III.

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* These waters fall within the limits of the following Coast and Geodetic Survey Charts: **A**, sailing chart, Atlantic coast, scale $\frac{1}{1,200,000}$, price $0.50; and are also shown in part on the following charts: **8**, Approaches to New York, Gay Head to Cape Henlopen, scale $\frac{1}{400,000}$, price $0.50; **9**, Cape May to Cape Henry, scale $\frac{1}{400,000}$, price $0.50; **120, 121, 122, 123, 124, 125, 126, 127, 128, 129, 130**, scale of each $\frac{1}{80,000}$, price of each $0.50. Portions of the coast are shown more in detail on harbor charts referred to under the several headings. All charts referred to in footnotes are issued by the Coast and Geodetic Survey.

Coast and Geodetic Survey charts can be obtained from the agents named in the list given on pages 7 and 8. Between pages 5 and 7 is an index map showing the location and limits of charts covering that part of the coast included in this volume. The catalogue of charts and other publications of the Survey also contain similar index maps; copies of this catalogue can be obtained free of charge on personal application at any of the sale agencies or by letter addressed to the Coast and Geodetic Survey Office, Washington, D. C.

TABLE OF LIGHTS. *(See Supplement, Art. 1.)*

Lighthouse Districts, Etc.—The coast and the waters covered by this volume lie within the **Third, Fourth, and Fifth Lighthouse Districts** of the United States. These districts extend from Gooseberry Point, Massachusetts, to the westward and southward as far as New River Inlet, North Carolina. The Light list for the seacoasts of the United States and the Buoy list for the Third, Fourth, and Fifth Districts give full descriptions of the aids to navigation.

Number.	Name.	Latitude, north. Longitude, west.	Characteristics of light.	Order of light.	Height of light above sea level, in feet.	Distance visible, in nautical miles.
		° ′ ″				
1	Entrance to New York Bay. — *Sandy Hook Light-vessel*	40 28 (15) 73 50 (09)	Fixed white 12 seconds, eclipse 3 seconds, four lanterns encircling masthead, electric.	Lens lantern.	54	12¾
2	*Wreck of the Scotland Light-vessel*	40 26 (48) 73 55 (17)	Two fixed red	Rcfl'rs.	{45} {45}	12
3	HIGHLANDS OF NAVESINK — NW. light	40 23 48 73 59 10	Fixed white	1	246	22¼
	SE. light	40 23 46 73 59 09	Fixed white	1	246	22¼
4	SW. Spit Range. — Sandy Hook (rear)	40 27 42 74 00 09	Fixed white	3	88	15
5	South Hook Beacon (front)	40 27 (47) 74 00 (24)	Fixed white	6	37	11¼
6	North Hook Beacon	40 28 (19) 74 00 (26)	Fixed white, with a fixed red sector between W. ⅞ S. and SW. by W. ¾ W.	4	44	12
7	Sandy Hook Fog Signal Station					
8	Romer Shoal	40 30 47 74 00 50	Fixed white	6	39	8½
9	Conover and Chapel Hill Range. — Conover Beacon (front)	40 25 17 74 03 22	Fixed white	Range lens.	57½	13
10	Chapel Hill Beacon (rear)	40 23 54 74 03 33	Fixed white	Range lens.	221½	21½
11	Main Channel Range. — Point Comfort Beacon (Bayside) (front)	40 26 53 74 07 18	Fixed white	Range lens.	42½	11¾
12	Waackaack (Wilson) (rear)	40 26 38 74 08 11	Two fixed white (see Remarks)	Range lens.	101½ 95½	16 15½
13	Old Orchard Shoal	40 30 (44) 74 06 (57)	Fixed 12 seconds, eclipses of 3 seconds. From SSW. ¾ W. through eastward to E. ½ S. the light shows white; from E. ½ S. to SSW. ¾ W. it shows red.	4	50½	12½
14	Swash Channel Range. — Elm Tree Beacon (front)	40 33 (51) 74 05 (45)	Fixed white	Range lens.	59½	13¼
15	New Dorp Beacon (rear)	40 34 51 74 07 14	Fixed white	Range lens.	189½	20
16	Princess Bay	40 30 28 74 12 50	Flashing white every 5 seconds	4	103½	16
17	Great Beds	40 29 (12) 74 15 (21)	Fixed red	4	54¼	11¼
18	Raritan River. — Western Jetty (lower end) Post-light, No. 1	40 30 (20) 74 18 (35)	Fixed red	Lantern.	13½	
19	Western Jetty (upper end) Post-light, No. 2	40 29 (54) 74 19 (09)	Fixed red	Lantern.	11½	
20	South Jetty Post-light, No. 3	40 29 (00) 74 20 (05)	Fixed white	Lantern.	13½	

NEW YORK TO CHESAPEAKE BAY ENTRANCE.

These pamphlets, which are corrected and repriuted from time to time, are sent free of charge to any shipmaster on application to the office of the Lighthouse Board, Washington, D. C., or to the Inspectors: Third District, P. O. box No. 2128, New York city, N. Y.; Fourth District, Philadelphia, Pa.; Fifth District, Baltimore, Md. They can also be had on application at the United States Branch Hydrographic Office at New York, Philadelphia, or Baltimore.

Number.	Color and peculiarity of lighthouse or vessel.	Height, in feet, from base of structure to center of lantern.	Fog signal.
1	Steam light-vessel, two masts, schooner-rigged, and no bowsprit. Mastheads black, and at each there is a black circular iron gallery under lanterns. Black smokestack and fog signals between the masts. Hull, red, with the words "SANDY HOOK" in large white letters on each quarter and "No. 51" in large white figures on each bow.	----------	12-inch steam whistle; blasts 3 seconds, silent intervals 12 seconds. If whistle be disabled a bell will be rung by hand.
2	Two masts, schooner-rigged; black circular cage-work day mark at each masthead. Hull, lead-color, with the word "SCOTLAND" in large black letters on each side and "7" on each quarter.	----------	Bell struck by hand.
3	Two brown towers connected by brown dwelling, on a line NW. and SE. NW. tower, octagonal; SE. tower, square.	53 53	----------
4	White tower, with white frame dwelling detached; lantern, black	77	----------
5	Tower, white; lantern, black	24	----------
6	Brown conical tower; lantern black. White dwelling 50 feet to southward of tower. Fog-signal building 700 feet from tower.	42	1st-class automatic steam siren; blasts 3 seconds, silent intervals 27 seconds.
7	White wedge-shaped skeleton structure	----------	Bell struck by machinery, a triple blow, every 10 seconds.
8	Brown cylindrical iron pier, surmounted by a white skeleton tower and lantern	25	----------
9	Tower covered in horizontal belts of white, red, and white. For the purpose of distinguishing this beacon more easily during the day, at times when the ground is covered with snow, black screens, each 20 by 25 feet, are built on each side of the tower; consequently the surface of the entire front is 25 by 60 feet, and shows the tower in belts of white, red, and white, between two black surfaces.	55	----------
10	White tower on dwelling. The front of the dwelling shows from the direction of the main chanuel of the bay a white surface of 25 by 40 feet. At each end are black screens of the same dimensious. The surface of the entire front is therefore 25 by 120 feet, and shows white between two black surfaces.	40	----------
11	Square, white wooden tower, rising from the roof of a white wooden dwelling; top of lantern, dark red.	40	----------
12	White, square, pyramidal, iron, skeleton tower, inclosing stair cylinder; lantern, black. The old white wooden tower, with black lantern, stands on the Main Channel Range line, 52 feet in front of the new iron tower.	96½ 91½	REMARKS.—The *upper* light in range with Point Comfort Beacon (front) marks the Main Channel Range line from the inner end of Gedney Channel to Southwest Spit. The *lower* light in range with Old Orchard Shoal Light marks the line of best water between Staten Island and West Bank, and also marks the easterly edge of the red sector of Old Orchard Shoal Light.
13	Black cylindrical pier, on which is a white and brown conical tower surmounted by a black lantern.	----------	----------
14	Tower, painted in bands two white and one red; roof of lantern, red	55	----------
15	White wooden tower on white dwelling	40	----------
16	Brown stone tower with dwelling attached	38	----------
17	White conical tower, on black conical foundation; lantern, black	42	----------
18	Small red oil house, with shelf on top for lantern	----------	----------
19	Small red oil house, with shelf on top for lantern	----------	----------
20	Small black oil house, with shelf on top for lantern	----------	----------

TABLE OF LIGHTS. (*See Supplement, Art. 2.*)

Number.		Name.	Latitude, north. Longitude, west.	Characteristics of light.	Order of light.	Height of light above sea level, in feet.	Distance visible, in nautical miles.
			° ′ ″				
21	New York Bay.	Coney Island	40 34 (35) 74 00 (46)	Flashing red every 10 seconds	4	75	14¼
22	New York Bay.	Fort Lafayette Fog Signal Station	40 36 28 74 02 (19)				
23	New York Bay.	Fort Tompkins	40 36 07 74 03 17	Flashing alternately red and white, interval between flashes, 10 seconds.	4	87½	15
24	New York Bay.	Fort Wadsworth					
25	New York Bay.	Robbins Reef	40 39 (27) 74 03 (57)	Flashing white every 6 seconds	4	56	13¼
26	New York Bay.	Liberty Enlightening the World	40 41 21 74 02 42	Electric		303	24¼
27	New York Bay.	Governors Island Post-light	40 41 (35) 74 01 (13)	Two fixed red	Lant'ns.	{60} {70}	
28	Newark Bay.	Bergen Point	40 38 35 74 08 54	Fixed white	6	45½	11¼
29	Newark Bay.	Corner Stake	40 38 (46) 74 10 (06)	Fixed red	Lantern.	8	
30	Newark Bay.	Passaic	40 41 46 74 07 38	Fixed white	5	45½	12¼
31	Newark Bay.	Elbow Beacon	40 42 (16) 74 07 (20)	Fixed red	Lantern.	12½	
32	Newark Bay.	Jeffreys Hook Post-light	40 51 (00) 73 56 (50)	Two fixed red	Lant'ns.	{28} {18}	
33	Hudson River.	Tarrytown	41 05 (00) 73 52 (28)	Fixed red	4	54½	13
34	Hudson River.	Rockland Lake	41 08 (49) 73 54 (18)	Fixed white 5 seconds, eclipse 5 seconds	4	50	12½
35	Hudson River.	Stony Point	41 14 28 73 58 20	Fixed white	5	178	12¾
36	Hudson River.	Iona Island Post-light	41 18 (30) 73 58 (43)	Fixed white	Lantern.	31½	
37	Hudson River.	Con Hook Post-light	41 21 (08) 73 57 (47)	Fixed white	Lantern.	31½	
38	Hudson River.	West Point	41 23 (45) 73 57 (04)	Fixed white	6	38½	11¼
39	Hudson River.	Danskammer Point	41 34 (25) 73 57 (47)	Fixed white	Lantern.	42½	
40	Hudson River.	Esopus Island Post-light	41 49 (30) 73 56 (52)	Two fixed red	Lant'ns.	{25} {10}	
41	Hudson River.	Esopus Meadows	41 52 (07) 73 56 (31)	Fixed white	5	51½	12½
42	Hudson River.	Rondout	41 55 14 73 58 01	Fixed white	6	40½	11¼
43	Hudson River.	Rondout South Dike Post-light	41 55 (02) 73 57 (59)	Fixed white	Lantern.	17½	
44	Hudson River.	Rondout North Dike Post-light (end)	41 55 (02) 73 57 (59)	Fixed red	Lantern.	19½	
45	Hudson River.	Rondout North Dike Post-light (middle)	41 55 (02) 74 57 (59)	Fixed red	Lantern.	19½	
46	Hudson River.	Saugerties South Dike Post-light		Fixed red	Lantern.	23½	
47	Hudson River.	Saugerties	42 04 20 73 55 47	Fixed white	6	40½	11¼
48	Hudson River.	Green Flats Post-light	42 05 (20) 73 55 (42)	Fixed red	Lantern.	13½	
49	Hudson River.	Upper Coal Beds Post-light	42 08 (38) 73 53 (50)	Fixed white	Lantern.	28½	
50	Hudson River.	Livingston Creek Post-light	42 10 (52) 73 57 (32)	Fixed red	Lantern.	28½	
51	Hudson River.	Catskill (West Flat) Post-light	42 12 (50) 73 50 (57)	Fixed white	Lantern.	12½	

NEW YORK TO CHESAPEAKE BAY ENTRANCE.

Number.	Color and peculiarity of lighthouse or vessel.	Height, in feet, from base of structure to center of lantern.	Fog signal.
21	White, square, pyramidal, skeleton, iron tower; lantern, black; keeper's dwelling about 15 feet to southward and eastward; fog bell tower near edge of bluff, to southward and westward of light tower.	61¼	Bell struck by machinery every 15 seconds.
22	----------	----------	Bell struck by machinery, alternately a single and a double blow, intervals 20 seconds.
23	Tower on white dwelling with mansard roof; lantern, black----------	40	----------
24	----------	----------	*To be established.*
25	Conical tower; lower half, brown; upper half, white; lantern, black; on white-washed stone pier.	46	Siren, blasts 3 seconds, silent intervals 3 seconds. If siren is disabled bell struck every 15 seconds.
26	Bronze statue on granite pedestal----------	----------	----------
27	White post, with shelf and ladder; one ladder on shelf and other on top of post. Fog bell house painted white.	----------	Bell struck by machinery, a double blow every 20 seconds.
28	Gray granite tower, in SE. angle of dwelling----------	41	Bell struck by machinery every 15 seconds.
29	Black cylindrical pier, surmounted by a small black oil house and a post with bracket, from which lantern is suspended.	----------	----------
30	White wooden tower attached to white dwelling----------	41	Bell struck by machinery every 20 seconds.
31	Dolphin of piles fastened together with black iron crane, from which lantern is suspended.	15	----------
32	Red post; lanterns, one vertically above the other----------	----------	----------
33	White conical tower, on red cylindrical foundation; lantern, black----------	44	Bell struck by machinery every 20 seconds.
34	Conical iron tower; lower half, brown; upper half, white; lantern, black; standing on black, cylindrical foundation pier.	----------	Bell struck by machinery, a double blow every 15 seconds.
35	White octagonal tower, detached from dwelling. Fog bell tower about 200 yards to eastward of light tower.	24	Bell struck by machinery every 15 seconds.
36	Black post----------	----------	----------
37	Black post----------	----------	----------
38	White hexagonal tower with lead-colored trimmings; wooden fog signal house below and in front of tower; lower part of house, white; upper part, shingled, natural color.	20	Bell struck by machinery every 20 seconds.
39	White woodon tower, with skeleton top, from front of which lantern is suspended--	31	Bell struck by machinery every 20 seconds.
40	Red post; lanterns, one vertically above the other----------	----------	----------
41	White tower and dwelling, on pier of rock-faced granite; mansard roof, dark-brown; lantern, black.	37	Bell struck by machinery every 10 seconds.
42	Square granite tower, in NE. angle of dwelling of dark granite, with light granite trimmings, on round granite pier; lantern, black.	32	----------
43	Black post----------	19	----------
44	Red post----------	21	----------
45	Red post----------	21	----------
46	Red post----------	----------	----------
47	Square drab brick tower, in SE. angle of drab dwelling; lantern, black----------	32	----------
48	Red pile dolphin----------	----------	----------
49	Black hexagonal structure, on black crib foundation----------	20	----------
50	Red hexagonal structure, on red crib foundation----------	20	----------
51	Black post, on black crib foundation----------	14	----------

TABLE OF LIGHTS. (*See Supplement, Art. 3.*)

Number.		Name.	Latitude, north. Longitude, west.	Characteristics of light.	Order of light.	Height of light above sea level, in feet.	Distance visible, in nautical miles.
			° ′ ″				
52	Hudson River.	Percy Reach Post-light	42 14 (41) 73 49 (38)	Fixed white	Lantern.	28½	
53	Hudson River.	Hudson City	48 15 02 73 47 (59)	Fixed white	6	52½	11¼
54	Hudson River.	Priming Hook Post-light		Fixed red	Lantern.	28½	
55	Hudson River.	West Flats Post-light	42 17 (40) 73 46 (50)	Fixed white	Lantern.	12½	
56	Hudson River.	Four-Mile Point	42 18 22 73 47 01	Fixed white	6	91½	11¼
57		Sea Girt Inlet	40 08 (12) 74 01 (38)	Flashing red every 6 seconds	4	52	13¼
58		BARNEGAT	39 45 52 74 06 24	Flashing white every 10 seconds	1	163	19
59		Tucker Beach	39 30 22 74 17 08	Fixed white for 1 minute, followed by six consecutive red flashes; interval between flashes 10 seconds.	4	48½	12¼
60		ABSECON	39 21 59 74 24 52	Fixed white	1	165	19
61		Ludlam Beach	39 09 42 74 41 05	Flashing white every 15 seconds	4	36	11¼
62		Hereford Inlet	39 00 24 74 47 28	Fixed white	4	52½	12½
63		*Northeast End Light-vessel, No. 44*	38 57 (45) 74 29 (34)	Fixed red (foremast) Fixed white (mainmast)	Refl'r	40 25	11½ 10
64		*Five-Fathom Bank Light-vessel, No. 40*	38 47 (20) 74 34 (36)	Two fixed white	Refl'r	40 45	11¼ 12
65		CAPE MAY	38 55 59 74 57 36	Flashing white every 30 seconds	1	164½	19
66		CAPE HENLOPEN	38 46 42 75 05 03	Fixed white, with a fixed red sector between SE. ⅛ E. and S. ⅛ E.	1	126	17
67	Delaware Bay.	Delaware Breakwater (E. end)	38 47 (50) 75 06 (02)	Fixed red to the southward of W. ¼ S. and ESE. ½ E.; fixed white throughout the remaining sector.	4	60½	13¼
68	Delaware Bay. Range.	Delaware Breakwater (front)	38 47 57 75 06 29	Fixed white 2½ seconds, eclipse 2½ seconds.	4	45	12
69	Delaware Bay. Range.	Delaware Breakwater (rear)	38 47 23 75 10 10	Fixed white from WSW. ¼ W. to WNW., and from SE. ⅛ S. to S. by E. ⅝ E.; dark throughout the remaining sectors.	3	103½	16
70	Delaware Bay.	Delaware Breakwater (W. end) Beacon		Fixed red	Lens lantern.	30	
71	Delaware Bay.	Mispillion Creek	38 56 52 75 18 56	Fixed white, with fixed red sector between N. ½ W. and N. ⅛ E.	6	46	11¼
72	Delaware Bay.	Brandywine Shoal	38 59 10 75 06 48	Fixed white 27 seconds, eclipse 3 seconds, to the westward of N. by W. ⅝ W. and SSE. ¼ E.; fixed red 27 seconds, eclipse 3 seconds, throughout the remaining sector.	3	43	11¾
73	Delaware Bay.	Fourteen-Foot Bank	39 02 (55) 75 10 (56)	Fixed white alternately 14 seconds and 40 seconds, eclipses 3 seconds, to the eastward of NNW. and SSE. ⅛ E.; fixed red alternately 14 seconds and 40 seconds, eclipses 3 seconds, throughout the remaining sector.	4	38	11½
74	Delaware Bay. Range.	Murderkill Creek (front) Beacon	39 03 (27) 75 23 (57)	Fixed white	Lens lantern.	8	
75	Delaware Bay. Range.	Murderkill Creek (rear) Beacon	39 03 (25) 75 24 (02)	Fixed white	Lens lantern.	40	
76	Delaware Bay. Range.	St. Jones Creek (front) Beacon	39 04 (01) 75 24 (05)	Fixed red	Lens lantern.	13	
77	Delaware Bay. Range.	St. Jones Creek (rear) Beacon	39 04 (00) 75 24 (10)	Fixed white	Lens lantern.	26	
78	Delaware Bay.	Maurice River	39 11 45 75 01 40	Fixed red	6	45	7½

NEW YORK TO CHESAPEAKE BAY ENTRANCE.

Number.	Color and peculiarity of lighthouse or vessel.	Height, in feet, from base of structure to center of lantern.	Fog signal.
52	Black hexagonal structure, on black crib fonndation	20	
53	Square red tower, rising from west front of red-brick dwelling, with limestone trimmings and mansard roof; on limestone pier.	36	Bell struck by machinery every 15 seconds.
54	Red post rising from the center of a small red structure		
55	Black post, on black crib foundation	14	
56	Brown conical tower, detached from white dwelling; lantern, black	25	
57	Square red-brick tower rising in the front of a two-story red-brick dwelling with light lead-colored trimmings; lantern, black. Windwill in rear of the lighthouse.	38	
58	Lower half of tower, white; upper half, red; lantern, black; dwelling, white, with lead-colored trimmings and green shutters.	150	
59	Tower and lantern, black; dwelling, white, with green shutters and lead-colored trimmings. Hotel near by, gray.	46	
60	Lower third of tower, orange yellow; middle third, black; upper third, including lantern, orange yellow. Two white dwellings, with lead-colored trimmings and green shutters.	159	
61	White dwelling, with lead-colored trimmings and green shutters, surmounted by black lantern.	29½	
62	Tower on white dwelling, with lead-colored trimmings and chimneys; lantern, black. Brick oil house.	49½	
63	Two masts, schooner-rigged; black hoop-iron day mark at foremast head, surmounted by black ball. Hull, red, with the words "NORTHEAST END" on each side, and "44" on stern, in large black letters and figures.		12-inch steam whistle; blasts 4 seconds, alternate silent intervals of 5 and 107 seconds. If whistle be disabled, a bell will be rung by hand.
64	Two masts, schooner-rigged; red hoop-iron day mark at each masthead. Hull, straw-color, with the words "FIVE FATHOM BANK" in large black letters on each side, and "No. 40" on each quarter in black figures.		12-inch steam whistle; blasts 4 seconds, silent intervals 56 seconds. If whistle be disabled, a bell will be rung by hand.
65	Tower, gray; lantern, red; two white dwellings, with lead-colored trimmings and green shutters.	159	
66	White tower and dwelling, standing in depression in the top of a high sand hill; lantern and watchroom, black.	82	
67	Brown conical tower, surmonnted by black lantern	51	2-class Daboll trumpet; blasts 3 seconds, silent intervals 27 seconds.
68	Light on white dwelling; lantern, black	43	
69	Brown skeleton tower; white dwelling near by, with lead-colored trimmings and green shutters.	100	
70	Red iron colnmn from which lens lantern is snspended	24	
71	White tower, connected with white dwelling with lead-colored trimmings and green shutters; lantern, black.	45	
72	Red screw-pile structure and screw-pile ice breaker; shutters, green		Bell struck by machinery, a double blow every 30 seconds.
73	Cylindrical foundation, expanding in trumpet shape under main gallery, surmounted by a two-story dwelling with gable roof; tower, surmounted by lantern, rises from E. side of dwelling. Entire structure painted brown.		2d-class Daboll trumpet; blasts 5 seconds, silent intervals 25 seconds.
74	White post		
75	White post		
76	White post		
77	White post		
78	Black lantern on white dwelling	39	

TABLE OF LIGHTS. (*See Supplement, Art. 4.*)

Number.	Name.	Latitude, north. Longitude, west.	Characteristics of light.	Order of light.	Height of light above sea level, in feet.	Distance visible, in nautical miles.
		° ′ ″				
79	Delaware Bay—Continued. Range. Maurice River (front)					
80	Range. Maurice River (rear)					
81	Egg Island	39 10 44 75 08 13	Fixed white	5	47	12¼
82	Cross Ledge	39 09 47 75 14 13	Fixed white 17 seconds, eclipse 3 seconds, to the westward of N. by W. ⅞ W. and SSE. ¾ E.; fixed red 17 seconds, eclipse 3 seconds, throughout the remaining sector.	4	52	12½
83	Mahon River	39 10 40 75 23 59	Fixed white with a fixed red sector between S. 26° 15′ W. (SSW. ⅜ W.) and S. 31° 25′ W. (SSW. ¾ W.) and another between W. ⅞ S. and W. ⅜ N.	4	54	12¾
84	Ship John Shoal	39 18 19 75 22 37	Fixed white 10 seconds, eclipse 5 seconds to the westward of NNW. ⅝ W. and SE. ¾ S.; fixed red 10 seconds, eclipse 5 seconds, throughout the remaining sector.	4	50	12¾
85	Cohansey	39 20 22 75 21 37	Fixed white with a fixed red sector between W. ½ S. and NW. by N.	5	42	12
86	Bombay Hook	39 21 49 75 30 38	Fixed white	4	43	12
87	Range. Port Penn (front)	39 29 32 75 35 22	Fixed white 2 seconds, eclipse 1 second	Range lens.	33½	
88	Range. Port Penn (rear)	39 30 41 75 36 34	Fixed white	Range lens.	133½	
89	Range. Reedy Island (front)	39 30 03 75 34 09	Fixed white 7 seconds, eclipse 1 second, excepting between N. ⅛ E. and N. by E. ⅞ E., in which fixed red 7 seconds, eclipse 1 second. White light somewhat obscured between SE. by E. and SW. by S.	5	29½	10½
90	Range. Reedy Island (rear)	39 31 (03) 75 34 (36)	Fixed white	Lens lantern.	103½	
91	Salem Creek	39 34 (16) 75 31 (07)	Fixed red with a fixed white sector to the southward and eastward of N. 76° 36′ W. (WNW. ⅞ W.) and N. 34° 34′ E. (NE. ⅞ N.)	Lens lantern.	16½	
92	Range. Finns Point (front)	39 35 39 75 32 18	Fixed white 2 seconds, eclipse 1 second	Range lens.	23½	
93	Range. Finns Point (rear)	39 37 02 75 32 03	Fixed white Fixed red	Range lens. Lens lantern.	98½	
94	Bulkhead Shoal Ranges. Range. New Castle (front)	39 38 33 75 35 44	Fixed white 2 seconds, eclipse 1 second	Range lens.	13½	
95	Bulkhead Shoal Ranges. Range. New Castle (rear)	39 38 54 75 35 58	Fixed white	Range lens.	83½	
96	Bulkhead Shoal Ranges. Range. Deep Water Point (front)	39 41 12 75 30 34	Fixed white 2 seconds, eclipse 1 second	Range lens.	18½	
97	Bulkhead Shoal Ranges. Range. Deep Water Point (rear)	39 41 59 75 29 38	Fixed white	Range lens.	91½	
98	Christiana Beacon	39 43 (09) 75 31 (01)	Fixed white	Lens lantern.	27	
99	Christiana	39 43 18 75 31 15	Fixed white	4	44	12¼
100	Cherry Island Flats Range. Cherry Island (front)	39 45 03 75 29 41	Fixed white 2 seconds, eclipse 1 second. Fixed red 2 seconds, eclipse 1 second, in the narrow sector between SW. ½ S. to S. W. ¼ W.	5	28	
101	Cherry Island Flats Range. Cherry Island (rear)	39 45 43 75 29 24	Fixed white	Refl'r	114	
102	Range. Schooner Ledge (front)	39 51 (28) 75 19 (27)	Fixed white 2 seconds, eclipse 1 second	Refl'r	31	
103	Range. Schooner Ledge (rear)	39 52 (14) 75 18 (03)	Fixed white	Refl'r	104	

NEW YORK TO CHESAPEAKE BAY ENTRANCE.

Number.	Color and peculiarity of lighthouse or vessel.	Height, in feet, from base of structure to center of lantern.	Fog signal.
79			To be established.
80			
81	Black lantern on white dwelling; brick pier foundation	45	
82	Black lantern on white dwelling, with lead-colored trimmings, green shutters, and mansard roof, on granite pier.	36	Bell struck by machinery every 10 seconds.
83	White tower; white dwelling, with lead colored trimmings and green shutters, attached; lantern, black.	51	
84	Black lantern surmounting brown octagonal dwelling, one story, with high mansard roof, on brown cylindrical foundation.		Bell struck by machinery, a triple blow every 45 seconds.
85	White frame dwelling on iron piles; lantern, black	35	
86	White dwelling, with lead-colored trimmings and green shutters; lantern, black	36	
87	White dwelling, with lead-colored trimmings and green shutters, surmounted by tower.	34	
88	Brown tower showing above trees; white dwelling with lead-colored trimmings and green shutters near by, but not visible in the range.	120	
89	White dwelling, with lead-colored trimmings and green shutters, surmounted by tower; lantern, black. Fog-signal house on bank, about 40 feet S. of old tower.	31	Bell struck by machinery every 15 seconds.
90	Black, triangular; pyramidal, skeleton, iron tower; the upper 40 feet of its channel face covered with a day mark of horizontal slats. A white one-story frame dwelling, with lead-colored trimmings, green shutters, and brown roof, just to the southward of the tower.	99	
91	White, hexagonal lantern on a red triangular pile structure		
92	Red tower, with white dwelling attached. Brick oil house	26	
93	Brown tower showing above trees	95	
94	White tower, 30 feet to westward of white dwelling, with lead-colored trimmings and green shutters.	11	
95	White tower, attached to white dwelling with lead-colored trimmings, green shutters, and red roof.	50	
96	Red tower and lantern, with square day mark on top, showing white horizontal bars; white dwelling with lead-colored trimmings and green shutters, attached. Roof of dwelling facing down river painted red.	17	
97	Brown tower, with dwelling near, but not vissible in the range	95	
98	Brown iron column, from which lantern is suspended, on crib		
99	Black lantern, on white dwelling with lead-colored trimmings and green shutters; roof, slate-color.	41	
100	White tower; lantern and roof, black. White dwelling near, with lead-colored trimmings and green shutters.	21	Bell struck by machinery every 15 seconds.
101	Tower and attached dwelling white, with lead-colored trimmings and green shutters; lantern, black.	39½	
102	Square red tower on white dwelling. Gable end of dwelling showing down river, painted white; lantern, red; white, elliptical, lattice-work day mark on a pole, on the range line, in rear of the dwelling and showing above its roof.	28	
103	Brown tower, showing well above trees	99	

TABLE OF LIGHTS. (*See Supplement, Art. 5.*)

Number.	Name.	Latitude, north. Longitude, west.	Characteristics of light.	Order of light.	Height of light above sea level, in feet.	Distance visible, in nautical miles.
		° ′ ″				
104	Delaware River—Continued. Tinicum Island and Fort Mifflin Bar Ranges. Billingsport (front for both)	39 50 51 75 15 11	Fixed white 2 seconds, eclipse 1 second	5	31	11¼
105	Tinicum Island (rear)	39 50 51 75 14 24	Fixed red	5	100	8½
106	Fort Mifflin Bar Cut (rear)	39 50 35 75 15 40	Fixed red	5	64	8½
107	Fort Mifflin Fog-Signal Station					
108	Horseshoe Range, West Group. Lower (front)		Fixed white	Refl'r	11	
109	Lower and Upper (rear for both)		Fixed white	Refl'r	41¼	
110	Upper (front)		Fixed red	Refl'r	11½	
111	Horseshoe Range, East Group. Lower (front)		Fixed red	Refl'r	19½	
112	Lower and Upper (rear for both)		Fixed white	5	52	
113	Upper (front)		Fixed white	Refl'r	16¾	
114	Schuylkill River Range. Schuylkill (front)	39 53 (20) 75 11 (36)	Fixed white	Lantern.	8	
115	Schuylkill (rear)	39 53 (26) 75 11 (33)	Fixed white	Lantern.	15	
116	CAPE MAY	38 55 59 74 57 39	Flashing white every 30 seconds	1	164½	19
117	CAPE HENLOPEN	38 46 42 75 05 03	Fixed white, with a fixed red sector between SE. ⅛ E. and S. ⅛ E.	1	126	17
118	*Fenwick Island Shoal Light-vessel, No. 52*	38 26 (47) 74 50 (44)	Two fixed red	Refl'r	20 37¾	9½ 11¼
119	Fenwick Island	38 27 (04) 75 03 (18)	Fixed white, varied by a white flash every 2 minutes.	3	82½	14¾
120	*Winter-Quarter Shoal Light-vessel, No. 45*	37 56 (55) 75 04 (20)	Fixed red	Refl'r	45	12
121	ASSATEAGUE	37 54 (40) 75 21 (23)	Fixed white	1	150	18½
122	Fishing Point Beacon	37 52 (22) 75 21 (28)	Fixed red	Lens lantern.	14	
123	Killick Shoal	37 56 (45) 75 22 (43)	Fixed white from NNW. ¼ W. through westward to S. ¼ E.; fixed red throughout the remaining sector.	4	46½	12¼
124	HOG ISLAND	37 23 (46) 75 41 (59)	Flashing white every 45 seconds; duration of flash 3 seconds.	1	180	19¾
125	*Cape Charles Light-vessel, No. 49*	37 05 (32) 75 43 (00)	Two fixed white	Refl'r	45 45	12
126	CAPE CHARLES	37 07 (22) 75 54 (23)	Flashing white, signaling "45" every minute, thus: 4 flashes, eclipse 6 seconds; 5 flashes, eclipse 32 seconds.	1	180	19¾
127	CAPE HENRY	36 55 35 76 00 27	Fixed white, with a fixed red sector between SSE. and SW. by W.	1	157	18¾

In the foregoing table the names of the lights are printed as follows, viz:
1st. PRIMARY SEACOAST LIGHTS.
2d. SECONDARY SEACOAST LIGHTS.
3d. *Light-vessels.*
4th. Sound, bay, and harbor lights.

The geographical positions of lighthouses which are uncertain by some seconds, not having yet been very accurately determined, and those of light-vessels, which vary somewhat in position, have the seconds inclosed thus: 30° 45′ (57″).

NEW YORK TO CHESAPEAKE BAY ENTRANCE—Continued.

Number.	Color and peculiarity of lighthouse or vessel.	Height, in feet, from base of structure to center of lantern.	Fog signal.
104	Detached, square, white, open framework tower; lantern, black; white dwelling, with lead-colored trimmings and green shutters, distant about 50 feet.	17	
105	Brown tower, showing above trees. Black staff, surmounted by black disk, with horizontal open spaces, on top of tower.	80	
106	Detached pyramidal white tower in front of dwelling. Lantern and watch room, black; dwelling, white, with lead-colored trimmings and green shutters.	56	
107	Open-frame bell tower		Bell struck by machinery every 15 seconds.
108	Small square white structure	6¼	
109	Square white tower, near white dwelling, with lead-colored trimmings and green shutters.	41	
110	Small square red structure	6¼	
111	Small square red structure	6¼	
112	Square white tower; dwelling near, painted white, with lead-colored trimmings and green shutters.	41	
113	Small square white structure	6¼	
114	Stand, with square black day mark having square white center, on a plank walk laid on piles.		
115	Post, with square black day mark having square white center, on a plank walk laid on piles. White dwelling, with lead-colored trimmings and green shutters, close to bank between the beacons.		
116	Tower, gray; lantern, red; two white dwellings, with lead-colored trimmings and green shutters.	159	
117	White tower and dwelling, standing in depression in the top of a high sand hill; lantern and watch room, black.	82	
118	Steam light-vessel. Two masts, schooner-rigged, no bowsprit. Mastheads, black, with black circular iron cage-work day mark at foremast head. Hull, red, with a broad white band covering the bulwarks, on which "FENWICK ISLAND SHOAL," is painted in large black letters and "No. 52" on each bow. Black smoke-stack and fog signal between the masts.		12-inch steam whistle; blasts 10 seconds, alternate silent intervals of 30 and 70 seconds. If whistle be disabled, a bell will be rung by hand.
119	Tower and two frame dwellings, white	82	
120	Two masts, schooner-rigged, no bowsprit; red hoop-iron day mark at mainmast head. Hull, red, with "WINTER-QUARTER, 45" in large white letters and figures on each side, and "45" on stern.		8-inch Crosby chime whistle, operated by compressed air; blasts, 3 seconds, alternate silent intervals of 59 seconds and 60 seconds. If whistle be disabled, a bell will be rung by hand.
121	Tower, red; lantern, black. Top of dwelling shows above trees from between S. and E.	129	
122	Light gray post with ladder, and elevated walk extending to beach		
123	Square frame dwelling and tower painted white, with lead-colored trimmings and green blinds, surmounted by black lantern. Red screw-pile foundation.		Bell struck by machinery every 15 seconds.
124	Black, octagonal, pyramidal, iron skeleton tower. Dwellings detached and not visible from seaward.	175	
125	Two masts, schooner-rigged, no bowsprit; red cage-work day mark at each mast-head. Hull, red, with "CAPE CHARLES, No. 49" in large white letters and figures on each side.		12-inch steam whistle; blasts, 5 seconds; silent intervals, 15 seconds. If whistle be disabled, a bell will be rung by hand.
126	White, octagonal, pyramidal, iron skeleton tower; lantern, black. Dwellings detached and not visible from seaward.	175	
127	Octagonal tower; base, service room, and lantern, black; shaft colored on each face, half white and half black, alternating, so that upper and lower halves of faces show alternately black and white. Dwellings and fog-signal house near. Old tower, SW. by W. 340 feet.	152	1st-class steam siren; blasts 5 seconds, silent intervals 90 seconds.

In the column of "Distance visible, in nautical miles," will be found the distances at which the lights can be seen, under ordinary states of the atmosphere, by observers at elevations of fifteen feet above the level of the sea.

In the column of "Characteristics of light," the time between flashes is given from beginning ot one flash to the beginning of the next succeeding one, and bearings are given from seaward.

Vessels approaching or passing light-vessels of the United States in *foggy* or *thick weather* will be warned of their proximity by the sounding of a *bell*, *fog horn*, or *whistle*, on board of the light-vessels, at intervals not exceeding five minutes.

The fact should be noted that sound signals are not always reliable. The sound may be lost while really approaching it, after being heard; or even when approached until close-to, it may not be heard at all, though properly made. These conditions are the exception, not the rule. They are, however, always possible and render great care necessary.

BEARINGS AND DISTANCES.

The following bearings and distances serve to indicate the relative positions of lighthouses and light-vessels along the coast, but can not, except where given between two light-vessels, in all cases be taken as courses to be steered:

Sandy Hook Light-vessel.—The following are bearings and distances from Sandy Hook Light-vessel:—

	Miles.
Whistling buoy off Fire Island, E. ⅛ S	28¾
Fire Island Light-vessel, E. ¾ S	29½
Nantucket Shoals Light-vessel, E. ¾ S	193
Bell buoy off Barnegat, SSW	44

Scotland Light-vessel.—The following are bearings and distances from Scotland Light-vessel:—

	Miles.
Sandy Hook Light-vessel, E. by N	4⅛
Whistling buoy off Fire Island, E	33
Fire Island Light-vessel, E. ½ S	33½
Bell buoy off Barnegat, S. by W. ½ W	42

Barnegat Lighthouse.—The following are bearings and distances from Barnegat Lighthouse:—

	Miles.
Fire Island Lighthouse, NE. ⅛ E	66
Montauk Point Lighthouse, NE. by E. ½ E	129¼
Gay Head Lighthouse, NE. by E. ⅞ E	176¾
Diamond Shoal Light-vessel, S. by W. ½ W. Westerly	287
Cape Hatteras Lighthouse, S. by W. ¾ W	279
Five Fathom Bank Light-vessel, SSW. ½ W	62¾

Five Fathom Bank Light-vessel.—The following are bearings and distances from Five Fathom Bank Light-vessel:—

	Miles.
Cape May Lighthouse, NW. by W. ¼ W	20
Hereford Inlet Lighthouse, NNW. ⅞ W	16½
Ludlam Beach Lighthouse, N. ⅝ W	23
Absecon Lighthouse, N. by E. ¾ E	35¼
Northeast End Light-vessel, NNE. ¼ E	11¼
Tucker Beach Lighthouse, NNE. ⅛ E	45
Montauk Point Lighthouse, NE. ⅝ E	184½
Gay Head Lighthouse, NE. by E. ⅛ E	230
Nantucket Shoals Light-vessel, ENE. ⅝ E	254½
Diamond Shoal Light-vessel, S. by W. ¼ W	225½
Cape Hatteras Lighthouse, S. by W. ½ W. Westerly	218
Winter Quarter Shoal Light-vessel, SSW. ⅝ W	57½
Cape Henlopen Lighthouse, W. ¼ N	23¾
Delaware Breakwater (E. end) Lighthouse, W. ⅝ N	24½

Winter Quarter Shoal Light-vessel.—The following are the bearings and distances from Winter Quarter Shoal Light-vessel:—

	Miles.
Fenwick Island Lighthouse, N. ¾ E	31¾
Fenwick Island Shoal Light-vessel, NNE. ¼ E	32¾
Diamond Shoal Light-vessel, S. ¾ W	170¾
Cape Hatteras Lighthouse, S. by W. Westerly	162
Cape Charles Light-vessel, SW. ¾ S	58¼
Cape Henry Lighthouse, SW. ⅜ S	74¼
Hog Island Lighthouse, SW. ⅛ W	42½
Whistling buoy off Chincoteague Shoals, SW. by W. ¾ W	11¾
Assateague Lighthouse, W. Northerly	12½

Cape Charles Light-vessel.—The following are bearings and distances from Cape Charles Light-vessel:—

	Miles.
Cape Charles Lighthouse, WNW. ¾ W	9¼ nearly.
Hog Island Lighthouse, N. ⅝ E	17¼
Assateague Lighthouse, NNE. ⅛ E	52
Montauk Point Lighthouse, NE	299¼
Nantucket Shoals Light-vessel, NE. by E. ½ E	355½
Diamond Shoal Light-vessel, S. ½ E	122
Currituck Beach Lighthouse, S. by W	43¼
Cape Henry Lighthouse, SW. by W. ⅛ W	17⅛

TIDES.†

GENERAL TABLE.

Locality.	Corrected Establishment.	Mean Rise and Fall.			Mean Duration of—	
		Mean tides.	Spring tides.	Neap tides.	Rise.	Fall.
	h. m.	*Feet.*	*Feet.*	*Feet.*	*h. m.*	*h. m.*
Sandy Hook	7 30	4·6	5·6	3·6	6 07	6 18
Great Beds light, Raritan River	7 41	5·4	6·5	4·2	5 57	6 28
Passaic light, Newark Bay	8 41	4·7	5·7	3·7	5 42	6 43
Governors Island, N. Y	8 04	4·4	5·3	3·4	5 58	6 27
Barnegat Inlet	7 50	2·2	2·7	1·7	6 07	6 18
Great Bay, New Jersey	8 29	2·8	3·4	2·2	6 03	6 22
Delaware Breakwater	8 16	4·4	5·3	3·4	6 25	6 00
Philadelphia	1 21	6·0	6·9	5·1	5 10	7 15
Chincoteague Inlet	7 38	2·8	3·4	2·2	6 01	6 24
Cape Charles	8 03	2·5	3·0	2·0	5 44	6 41

VARIATION OF THE COMPASS.

The magnetic variations for 1898 and annual increase at points mentioned are as follows:

Locality.	Variation, 1898.	Annual increase.
	°	′
Sandy Hook Light-vessel	8⅔ W.	2¾
Narrows, New York Bay	8⅔ W.	2¾
Off Barnegat	7¾ W.	2¾
Five Fathom Bank Light-vessel	6½ W.	3
Reedy Island, Delaware River	6½ W.	3
Chester, Delaware River	7 W.	3¾
Philadelphia, Delaware River	7⅓ W.	4
Winter Quarter Shoal Light-vessel	5⅓ W.	3
Cape Charles Light-vessel	4 W.	2¾

WIND SIGNAL STATIONS.

The wind signals of the U. S. Weather Bureau are shown for the benefit of mariners at the following points. The list of stations has been corrected to January, 1898. The signals are described and their meaning is explained in Appendix II.

New York, N. Y.
Bath Beach, N. Y.*
Perth Amboy, N. J.*
Port Monmouth, N. J.*
Sandy Hook, N. J.*
Highland Beach, N. J.*
Long Branch, N. J.*
Little Egg Life-Saving Sta., N. J.*
Atlantic City, N. J.
Gt. Egg Life-Saving Sta., N. J.*
Ocean City Life-Saving Sta., N. J.*
Cape May, N. J.
Port Norris, N. J.
Delaware Breakwater, Del.
Reedy Island, Del.

SEACOAST TELEGRAPH STATIONS.

The Western Union Telegraph Company maintains telegraph stations at the following places, from which passing steamers are reported either to the Maritime Exchange in New York, or the Merchants' Exchange in Philadelphia, for the information of members, and from these exchanges the reports are distributed to the newspapers.

Highlands, N. J.
Delaware Breakwater, Del.
Sandy Hook, N. J.
New Castle, Del.
Quarantine, Staten Island.
Marcus Hook, Pa.

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*The stations marked thus are special display stations and are not operated by regular Weather Bureau observers.

†**Tide Tables for the Atlantic Coast,** published annually by the U. S. Coast and Geodetic Survey, predicting the times and heights of tides for every day of the year, at all the principal ports, can be obtained from the agents named in the list given on pages 7 and 8; price, $0.50.

UNITED STATES LIFE-SAVING STATIONS.

The following list of life-saving stations has been corrected to July, 1897. The geographical positions given are approximate and are taken from the official register of the service. These stations are furnished with lifeboats, mortars, and all other appliances for affording assistance in cases of shipwreck.*

Name of Station.	State.	Locality.	Approximate Position.					
			Latitude, North.			Longitude, West.		
			°	′	″	°	′	″
Sandy Hook	N. J	On bay side, ½ mile south of point of Hook	40	27	51	74	00	27
Spermaceti Cove	N. J	2½ miles south of Sandy Hook light	40	25	40	73	59	00
Seabright	N. J	About 1 mile south of Navesink light	40	22	50	73	58	30
Monmouth Beach	N. J	About 1 mile south of Seabright	40	20	30	73	58	30
Long Branch	N. J	Greens Pond	40	16	40	73	59	00
Deal	N. J	Asbury Park	40	13	50	73	59	50
Shark River	N. J	Near the mouth of Shark River	40	11	30	74	00	40
Spring Lake	N. J	2½ miles south of Shark River	40	09	20	74	01	20
Squan Beach	N. J	1 mile southeast of Squan village	40	07	00	74	02	00
Bayhead	N. J	At the head of Barnegat Bay	40	04	00	74	02	40
Mantoloking	N. J	2½ miles south of head of Barnegat Bay	40	01	40	74	03	10
Chadwick	N. J	5 miles south of head of Barnegat Bay	39	59	10	74	04	00
Toms River	N. J	On the beach abreast mouth Toms River	39	56	10	74	04	30
Island Beach	N. J	1¼ miles south of Seaside Park	39	53	40	74	05	00
Cedar Creek	N. J	5⅝ miles north of Barnegat Inlet	39	51	10	74	05	10
Forked River	N. J	2 miles north of Barnegat Inlet	39	48	10	74	05	40
Barnegat	N. J	South side of Barnegat Inlet	39	45	30	74	06	10
Loveladies Island	N. J	2½ miles south of Barnegat Inlet	39	43	50	74	07	20
Harveys Cedars	N. J	5½ miles south of Barnegat Inlet	39	41	20	74	08	30
Ship Bottom	N. J	Midway of Long Beach	39	38	10	74	11	00
Long Beach	N. J	1⅝ miles north of Beach Haven	39	35	00	74	13	20
Bonds	N. J	2¼ miles south of Beach Haven	39	32	00	74	15	20
Little Egg	N. J	Near the light north of Inlet	39	30	10	74	17	20
Little Beach	N. J	South side of Little Egg Inlet	39	27	30	74	19	30
Brigantine	N. J	5½ miles north of Absecon light	39	25	30	74	20	30
South Brigantine	N. J	3⅛ miles north of Absecon light	39	24	00	74	22	30
Atlantic City	N. J	At Absecon light	39	22	00	74	24	50
Absecon	N. J	2¾ miles south of Absecon light	39	20	50	74	27	40
Great Egg	N. J	6¾ miles south of Absecon light	39	19	00	74	31	10
Ocean City	N. J	South side of Egg Harbor Inlet	39	17	20	74	34	00
Pecks Beach	N. J	3½ miles north of Corson Inlet	39	14	50	74	36	50
Corson Inlet	N. J	Near the Inlet, north side	39	13	10	74	38	20
Sea Isle City	N. J	3¼ miles north of Townsend Inlet	39	09	40	74	41	05
Townsend Inlet	N. J	Near the Inlet, north side	39	07	30	74	42	45
Avalon	N. J	3¾ miles southwest from Ludlam Beach light	39	05	50	74	43	10
Tathams	N. J	3½ miles north of Hereford Inlet	39	03	40	74	45	00
Hereford Inlet	N. J	Near Hereford light	39	00	20	74	47	20
Holly Beach	N. J	6 miles northeast of Cape May City	38	58	40	74	49	50
Turtle Gut	N. J	4 miles northeast of Cape May City	38	57	10	74	51	10
Cold Spring	N. J	½ miles east of Cape May City	38	56	00	74	54	30
Cape May	N. J	Near the light	38	55	40	74	57	30
Bay Shore	N. J	2½ miles west of Cape May City	38	56	40	74	58	10
Lewes	Del	2 miles west from Cape Henlopen light	38	46	50	75	07	10
Cape Henlopen	Del	⅞ mile southerly of Cape Henlopen light	38	45	50	75	04	50
Rehoboth Beach	Del	Opposite north end of Rehoboth Bay	38	41	30	75	04	20
Indian River Inlet	Del	North of Inlet	38	37	50	75	03	40
Fenwick Island	Del	1½ miles north of light	38	28	20	75	03	00
Ocean City	Md	Just north of village	38	20	00	75	05	00
North Beach	Md	10 miles south of Ocean City	38	11	30	75	09	20
Green Run Inlet	Md	13½ miles northeast of Assateague light	38	04	30	75	12	50
Popes Island	Va	10 miles northeast of Assateague light	38	00	20	75	15	40
Assateague Beach	Va	1⅛ miles south of Assateague light	37	53	40	75	21	40
Wallops Beach	Va	1½ miles south of Chincoteague Inlet	37	52	00	75	26	50
Metomkin Inlet	Va	On Metomkin Beach, near the Inlet	37	40	45	75	34	50
Wachapreague	Va	South end of Cedar Island	37	35	20	75	36	40
Paramores Beach	Va	Midway of Beach	37	32	20	75	37	20
Hog Island	Va	South end of Hog Island	37	22	20	75	42	45
Cobb Island	Va	South end of Cobb Island	37	17	30	75	47	00
Smith Island	Va	At Cape Charles light	37	07	00	75	53	40

*Instructions to enable mariners to avail themselves fully of the assistance thus afforded will be sent free of charge upon application to the General Superintendent of the Life-Saving Service, Washington, D. C.

CURRENTS.

CURRENT TABLE FOR NEW YORK LOWER BAY.

	Locality of Station.					
	New York Lower Bay, Fourteen Feet Channel.		New York Lower Bay, East Channel.		Swash, Main, and Gedney channels.	
	Compass direction.	Velocity.	Compass direction.	Velocity.	Compass direction.	Velocity.
		Knots.		*Knots.*		*Knots.*
Hours before H. W. at Sandy Hook—2	W.	1.6	NW.	1.9	W.	1.8
Hours before H. W. at Sandy Hook—1	W.	1.3	NW.	1.5	W.	1.5
Hours before H. W. at Sandy Hook—0	W.	0.8	NW.	1.0	W.	0.5
Hours after H. W. at Sandy Hook—1	W.	0.2	SE.	0.2	E.	0.7
Hours after H. W. at Sandy Hook—2	E.	0.6	SE.	1.0	E.	1.7
Hours after H. W. at Sandy Hook—3	E.	1.5	SE.	1.7	E.	2.1
Hours before L. W. at Sandy Hook—2	E.	1.9	SE.	2.2	E.	2.1
Hours before L. W. at Sandy Hook—1	E.	1.7	SE.	2.1	E.	1.7
Hours before L. W. at Sandy Hook—0	E.	1.2	SE.	1.5	E.	1.0
Hours after L. W. at Sandy Hook—1	E.	0.0	SE.	0.2	W.	0.0
Hours after L. W. at Sandy Hook—2	W.	0.9	NW.	1.0	W.	1.1
Hours after L. W. at Sandy Hook—3	W.	1.4	NW.	1.7	W.	1.7

Fourteen Feet Channel.—Both ebb and flood currents set obliquely across the channel.

East Channel.—Slack water lasts about twenty-five minutes.

Swash, Main, and Gedney Channels.—Slack water lasts about twenty-five minutes.

The half-ebb currents in the Swash Channel set to the eastward strongly.

In the Main and Swash the flood current starts it on the north side of the channel thirty minutes earlier than on the south side, and the ebb current starts out on the south side of the channel thirty minutes earlier than on the north side.

	Locality of Station.	
	Lower Bay, near West Side of East Bank.	
	Compass direction.	Velocity.
		Knots.
Hours before H. W. at Governors Island—2	N. $\frac{3}{4}$ W.	1.2
Hours before H. W. at Governors Island—1	N. $\frac{3}{4}$ W.	1.1
Hours before H. W. at Governors Island—0	N. by W.	0.8
Hours after H. W. at Governors Island—1	NNW.	0.2
Hours after H. W. at Governors Island—2	SE. by E. $\frac{1}{4}$ E.	0.4
Hours after H. W. at Governors Island—3	S. by E. $\frac{1}{4}$ E.	1.1
Hours before L. W. at Governors Island—2	S.	1.9
Hours before L. W. at Governors Island—1	S. $\frac{1}{2}$ E.	2.2
Hours before L. W. at Governors Island—0	S. $\frac{1}{2}$ E.	1.9
Hours after L. W. at Governors Island—1	S. $\frac{1}{4}$ W.	1.1
Hours after L. W. at Governors Island—2	NNW. $\frac{1}{2}$ W.	0.2
Hours after L. W. at Governors Island—3	N. by W. $\frac{3}{4}$ W.	0.8

Near West Side of East Bank.—There is usually a slack before the flood current lasting about ten minutes.

The current does not actually stop after the flood and before the ebb. At about forty-five minutes before the time given in the table as "slack before ebb" the current is flowing toward the northeast. It gradually turns, and, as shown in the table, is flowing directly toward the east at the time when it has the least velocity, which is then about one-half knot per hour. About thirty-five minutes later it is flowing southeast. During all this interval the velocity crosswise the channel is about one-half knot per hour.

CURRENT TABLE FOR NEW YORK HARBOR AND HUDSON RIVER.

	Locality of Station.			
	Hudson River, New York, off Thirty-ninth street.		The Narrows, New York Harbor.	
	Compass direction.	Velocity.	Compass direction.	Velocity.
		Knots.		*Knots.*
Hours before H. W. at Governors Island—2	NE. ½ N.	0.7	NNW.	1.1
Hours before H. W. at Governors Island—1	NE. ½ N.	1.7	NNW.	1.2
Hours before H. W. at Governors Island—0	NE. ½ N.	2.2	NNW.	0.7
Hours after H. W. at Governors Island—1	NE. ½ N.	1.9	NNW.	0.2
Hours after H. W. at Governors Island—2	NE. ½ N.	1.1	S. by E.	0.6
Hours after H. W. at Governors Island—3	NE. ½ N.	0.0	S. by E.	1.2
Hours before L. W. at Governors Island—2	SW. by S.	1.5	S. by E.	1.7
Hours before L. W. at Governors Island—1	SW. by S.	2.5	S. by E.	1.5
Hours before L. W. at Governors Island—0	SW. by S.	3.1	S. by E.	1.1
Hours after L. W. at Governors Island—1	SW. by S.	2.7	S. by E.	0.6
Hours after L. W. at Governors Island—2	SW. by S.	1.8	S. by E.	0.2
Hours after L. W. at Governors Island—3	SW. by S.	0.5	NNW.	0.6

Off Thirty-ninth street.—In the path of the Hudson, from The Narrows to the Tappan Sea, it is running flood 15 feet below the surface fully an hour before the turning from ebb to flood at the surface.

Slack before ebb lasts from forty to fifty-five minutes.

Slack before flood lasts about thirty-five minutes.

The Narrows.—Slack water lasts from fifteen to thirty minutes. Both the ebb and flood currents appear first on the east side.

CURRENT TABLES FOR DELAWARE BAY OFF CAPE HENLOPEN.

	Locality of Station.	
	Cape Henlopen, Delaware, 1 mile W. of Whistling Buoy.	
	Compass direction.	Velocity.
		Knots.
Hours before H. W. at Sandy Hook—2	WNW.	1.9
Hours before H. W. at Sandy Hook—1	WNW.	1.8
Hours before H. W. at Sandy Hook—0	WNW.	1.3
Hours after H. W. at Sandy Hook—1	NW. by W. ¾ W.	0.5
Hours after H. W. at Sandy Hook—2	S. by E. ¼ E.	0.5
Hours after H. W. at Sandy Hook—3	SSE.	1.3
Hours before L. W. at Sandy Hook—2	SSE.	2.0
Hours before L. W. at Sandy Hook—1	SSE.	2.2
Hours before L. W. at Sandy Hook—0	S. by E. ¼ E.	1.7
Hours after L. W. at Sandy Hook—1	S. ¾ E.	0.9
Hours after L. W. at Sandy Hook—2	NW. ¼ N.	0.2
Hours after L. W. at Sandy Hook—3	NW. by W.	1.3

CURRENT TABLE FOR THE DELAWARE RIVER.

	Locality of Station.			
	Off New Castle, Del., near Delaware shore.		Philadelphia, Pa., foot of Petty Island.	
	Compass direction.	Velocity.	Compass direction.	Velocity.
		Knots.		*Knots.*
Hours before H. W. at Philadelphia—2	NE.	2.4	E. by N.	1.6
Hours before H. W. at Philadelphia—1	NE.	1.3	E. by N.	1.9
Hours before H. W. at Philadelphia—0	SW. by S.	0.2	E. by N.	1.8
Hours after H. W. at Philadelphia—1	SW. by S.	1.4	E. by N.	1.3
Hours after H. W. at Philadelphia—2	SW. by S.	2.0	SW. by W.	0.3
Hours after H. W. at Philadelphia—3	SW. by S.	2.2	SW. by W.	0.8
Hours before L. W. at Philadelphia—2	SW. by S.	1.0	SW. by W.	1.9
Hours before L. W. at Philadelphia—1	NE.	0.4	SW. by W.	1.6
Hours before L. W. at Philadelphia—0	NE.	2.0	SW. by W.	0.9
Hours after L. W. at Philadelphia—1	NE.	2.9	E. by N.	0.6
Hours after L. W. at Philadelphia—2	NE.	3.1	E. by N.	1.2
Hours after L. W. at Philadelphia—3	NE.	2.6	E. by N.	1.6

Off New Castle.—The results given in the table refer only to one-third of the width of the river nearest the Delaware shore. They should not be used for the other two-thirds of the width of the river.

This table is based on observations made in the month of August. The greater river current at certain times of the year will cause changes in the velocities and in the times of slack.

Philadelphia, foot of Petty Island.—This table is based on observations made in the month of July. The greater river current at certain times of the year will cause changes in the velocities and in the times of slack.

NEW YORK BAY AND HARBOR.*

New York Bay affords the principal access by water to New York City and surrounding ports. It is of irregular shape and is divided by a passage 1 mile wide, known as **The Narrows**, into an **Upper** and **Lower bay.**

LOWER BAY.

The entrance to the bay is between **Sandy Hook** to the southward and **Coney Island** to the northward, and is about 6 miles wide. An extensive bar, through which several channels lead, extends across the entrance. By the best of these channels (see channels) the deepest draft vessels can go up to the city.

The Lower Bay extends from the entrance to The Narrows. It is triangular in shape, and portions of it have special names.

Sandy Hook Bay is the southern part of the Lower Bay, lying to the westward of Sandy Hook and to the eastward of **Point Comfort**, about 6 miles westward of the Hook beacon. The bay is an excellent anchorage for vessels of any draft, the depth of water ranging from 5 fathoms, just inside Hook, to 15 feet near its southern part; the shoaling is gradual and the bottom good holding ground. Extensive shoals make off to the northward and eastward from Point Comfort, but as the depth of water decreases gradually the lead will give sufficient warning of too close an approach to the shore. The best anchorage is in the eastern part of the bay, giving the shore of Sandy Hook a berth of about ½ mile. (*See Supplement, Art. 6.*)

Navesink River and **Shrewsbury River**, through one common entrance, empty into the southern extremity of Sandy Hook Bay to the eastward of the Highlands of Navesink. These two rivers are shallow, but are being improved under the supervision of the U. S. Engineers, the object being to obtain a channel with a depth of 6 feet at low water from the deep water of Sandy Hook Bay to **Branchport** on the Shrewsbury River, and **Red Bank** on the Navesink River. At present the channel from Sandy Hook Bay into the rivers has a depth of about 7 feet, and is only used by small steamers and sailing vessels. One drawbridge crosses the main entrance to the eastward of Navesink Lighthouses, and another about 2 miles farther up, near the mouth of the Shrewsbury River. Strangers should not attempt to enter these rivers without a pilot. (*See Supplement, Arts. 7 and 8.*)

Raritan Bay is the name given to the body of water lying to the westward of Point Comfort and to the southward of Staten Island; see heading "Raritan Bay."

Gravesend Bay is a small bay which makes into the Long Island shore between The Narrows and the western end of Coney Island. In the northern part of the bay good anchorage, in 11 to 16 feet of water, will be found, but the southern part is very shoal, having only a depth of 1 to 6 feet. On the eastern shore of the bay are several wharves used by steamers running to Bath Beach, which is a summer resort.

The northwestern part of the Lower Bay is covered by extensive flats with 1 to 16 feet over them, known as **Staten Island Flats**, making off to the southeastward from Staten Island. Parts of these flats are known as **Old Orchard Shoal** and **West Bank**, which borders on the main channel up the bay. Near the southeastern extremity is Old Orchard Shoal Lighthouse and near the eastern edge of West Bank are Swinburn and Hoffmann islands, artificial islands on the shoalest part of the bank. **Swinburn Island**, the southernmost one, will appear as a number of long, low, white houses, in front of which will be seen a two-story dwelling house. **Hoffman Island** is about ¾ mile to the northward of Swinburn Island and 1¼ mile to the southward of Fort Tompkins Lighthouse. On approaching it from the southward it will appear as a mass of stone, brick, and other débris, apparently loosely thrown together and supporting two long brick houses two stories high.

Sandy Hook, the southern, and **Norton Point**, the northern point of entrance, are both low and sandy. On Sandy Hook is the **North Hook beacon** with fog signal (siren) hut near it, and about 700 yards west of the beacon is a fog signal (bell) tower (see page 10). These buildings and a dwelling house are near the point of the Hook; to the southward of these are an unfinished granite fortification, some low houses, Sandy Hook Lighthouse, South

*Shown on charts **120**, scale $\frac{1}{80,000}$, price $0.50; **369**, scale $\frac{1}{40,000}$, price $0.75; and in part on charts **369⁴**, **369⁸**, scale $\frac{1}{10,000}$, price of each $0.50.

Hook beacon, a life-saving station (see page 10), and a wind signal display station. There is also a signal station from which vessels are reported to the Maritime Exchange in New York City. **Norton Point**, the western end of Coney Island, is marked by Coney Island Lighthouse (see table, page 12). Several hotels and other buildings are on the point, and thence eastward the beach of Coney Island presents an almost continuous line of hotels and summer houses. *Iron piers*, the landing place of steamboats to Coney Island, make out from the south shore of Coney Island, 1½ miles to the eastward of Coney Island Lighthouse and are quite prominent.

Prominent objects.—The most prominent landmark to the southward of the entrance, in approaching from seaward, is the high wooded ridge forming the **Highlands of Navesink**, on the side of which, in a cleared space, are two conspicuous lighthouses. The two fixed white lights shown here are visible 22 miles in clear weather (see "Table of Lights," page 10). North of the entrance the **Centennial Tower** on Coney Island is a prominent object.

The principal guides to the immediate entrance are Sandy Hook Light-vessel (see page 10) off Gedney Channel and Scotland Light-vessel (see page 10) off South Channel.

Staten Island, which forms the northwestern shore of New York Lower Bay, is a large island, somewhat triangular in shape, with its base to the northeastward, and a length of 11⅝ miles. It lies **NE.** and **SW.**, and its backbone, which is composed of high wooded hills diversified with ornamental grounds dotted with villas, is one of the most conspicuous features of the immediate approaches to New York.

Channels.—Several buoyed channels lead across the bar which extends from Sandy Hook to Coney Island. Three of these—False Hook, South, and Gedney channels—approach each other in their courses toward the bay until they meet, still on the bar, in a basin from which two other channels, the Main and Swash, lead into the Lower Bay. To the northward of these are East and Fourteen Feet channels. Light-draft vessels can cross the bar close to the Coney Island shore by what is locally known as the Coney Island Channel.

The principal channel, and the one having the greatest depth (30 feet at mean low water), is **Gedney Channel.** A red first-class nun buoy and four red buoys (spars, each showing red electric light at night) mark its northern edge, and two black first-class can buoys and four black buoys (spars, each showing white electric light at night) mark its southern edge and lead up to the range which serves as a guide through Main Channel; Gedney Channel also leads into Swash Channel. Gedney Channel whistling buoy (nun-shaped, black and white perpendicular stripes) lies off the entrance to Gedney Channel, and directly on a line between the entrance and Sandy Hook Light-vessel, bearing from the latter **WNW.** ¼ **W.**, distant nearly 3¼ miles.

South Channel is the next channel of importance, and has a least depth of 21 feet. A straight course leads from its entrance through it and Swash Channel into the bay.

Main Channel leads from the inner end of Gedney Channel, in a **W.** by **S.** direction between the shoal making out from the point of the Hook, on its southern side, and Flynns Knoll on its northern side; the least depth in the middle of the channel is 31 feet at mean low water. The northern side of the channel is marked by red buoys, the last of these, No. 12 (with perch and ball), marks the turning point into the main channel up the bay; 50 feet **NNE.** from this buoy there is a red spar buoy showing red electric light at night. On the shoal making out to the northeastward from Hook Beacon there is a black bell buoy.

The *main channel up the bay* runs along to the westward of Southwest Spit, Flynns Knoll, and East Knolls, and is marked by four red buoys (nuns, Nos. C 2, C 4, C 6, and C 8) on its eastern side and a black electric-lighted buoy and three black buoys (can, Nos. C 1, C 3, and C 5) on its western side. These buoys are replaced by spar buoys in winter. According to the report of the Chief of Engineers, U. S. Army, the channel from buoy No. 12 to the deep water of The Narrows has a least width of 1,000 feet, and a least depth of 30 feet for that width.

The **Swash Channel** leads from the junction of the Gedney and South channels in a northwesterly direction between Romer Shoal and East Knolls, and its course follows close to the southern edge of Romer Shoal. It is a narrow channel through which 23 feet can be carried, but in which are several lumps, over which there is a depth of only 22 feet. At the junction of the Gedney and Swash channels are two red buoys, one a nun with perch and square, the other electric-lighted, showing a fixed white light.

False Hook Channel leads along and close to the eastern shore of Sandy Hook and joins the main channel to eastward of the point of the Hook. It is buoyed and has a depth of 19 feet, but is not safe for strangers.

East Channel, to the northward of Gedney and Swash channels, has a depth of 19 feet and is buoyed. Near its eastern entrance there are spots with from 14 to 18 feet over them.

Fourteen Feet Channel runs across East Bank to the northward of East Channel and has a depth of 14 feet, but it is not buoyed, is seldom used, and should not be attempted by strangers.

Ranges.—*At night* the use of the range lights enables vessels to enter readily in clear weather. *By day* it is often difficult, if not impossible, to pick up the ranges. The electric lighted buoys of Gedney Channel make its entrance easy. The **Point Comfort beacons** (Point Comfort and Waackaack) form the range for the main

channel until Sandy Hook Lighthouse and South beacon (in range) become the guides. When inside, **Conover** and **Chapel Hill beacons** form the range (astern) for going up the bay. For South and Swash channels **Elm Tree** and **New Dorp beacons** form the range.

THE NARROWS

is that part of New York Bay which lies between the extreme western point of Long Island and the eastern point of Staten Island, and connects the Lower and Upper bays. It is 1 mile wide, is deep (having 8 to 16 fathoms of water), and unobstructed if the eastern shore be given a berth of $\frac{1}{4}$ mile. On its western side is **Fort Tompkins** and on its eastern side **Fort Hamilton** and **Fort Lafayette.** The latter is about $\frac{1}{4}$ mile from the Long Island shore on the edge of the flats, and is a circular brickwork. There is a fog-signal station, but no light here. To the southward of Fort Tompkins there is a lighthouse (see page 12) as a guide to The Narrows. Above this fort on Staten Island are the towns of **Clifton, Stapleton Tompkinsville,** and **New Brighton,** which have communication with New York by ferry.

At Southfield, just above Fort Wadsworth, are the **Quarantine Headquarters** and **Boarding Station.** On the eastern side of The Narrows, just above Fort Hamilton, there is a village of the same name, and 1 mile farther to the northward is the village of **Bay Ridge.** (*See Supplement, Art. 10.*)

UPPER BAY AND HARBOR

extend from The Narrows to the **Battery** (the southern point of Manhattan Island) at the confluence of the **Hudson** and **East** rivers. It is about 4 miles long north and south and from 2 to $3\frac{3}{4}$ miles wide east and west.

The whole of the western part of the bay is covered by extensive flats, with 1 to 6 feet over them, known as **Jersey Flats.** For a description of these flats see dangers under section 5, Sailing Directions, New York Bay.

The **Kill Van Kull,** with 4 to 7 fathoms of water, connects the bay with Newark Bay and the Arthur Kill, and separates the northern shore of Staten Island from **Bergen Neck.**

Gowanus Bay is the name of the bight in the Long Island shore about 2 miles above The Narrows. It is important and much frequented on account of its dry docks and facilities for repairing vessels. It is shallow, and an extensive shoal, Gowanus Flats, lies off it. Two dredged channels lead into Gowanus Bay; the one from the southward, known as **Bay Ridge Channel,** has a depth of 25 feet; the channel from the northward, known as **Red Hook Channel,** has a depth of 27 feet and follows the wharves from Red Hook into Gowanus Bay. **Erie Basin** is on the north side of the entrance to the bay and is usually entered from the Red Hook Channel. The channel depth in **Gowanus Creek** is 21 feet. (*See Supplement, Art. 11.*)

The *main channel up the bay,* from The Narrows to the city, leads between Jersey Flats and Gowanns Flats, and has a depth of 5 to 15 fathoms and a width of about $\frac{1}{2}$ mile.

Governors Island, lying in the northeastern part of the bay, at the mouth of the East River, is occupied by **Fort Columbus.** On the northwestern point of the island are **Castle William** and a light and fog-signal station (see page 12). The main channel into East River leads north of the island. (*See Supplement, Art. 12.*)

Between Governors Island and Brooklyn, **Buttermilk Channel** leads from the bay into East River and forms the access to **Atlantic Docks.** The least depth in the channel is 25 feet. The eastern part of the channel is broad and unobstructed, but the western part is about 300 yards wide, between two shoals, one making to the southward and westward from Governors Island, and the other to the northward between Red Hook and Atlantic Docks. A black bell buoy at the southern entrance and a black spar buoy abreast of Governors Island mark the northern edge of the channel, and a red spar buoy marks its southern limit at the northern point of Red Hook Flats. (*See Supplement, Art. 13.*)

Anchorage.—The anchorage limits and harbor regulations are given in Appendix I.

Pilotage is compulsory for foreign vessels, vessels from a foreign port, and all vessels sailing under register. Pilots generally board vessels bound to New York between Fire Island and Barnegat Inlet. Pilot boats are also always found near Sandy Hook. The pilot laws and regulations will be found in Appendix I.

The **Buoyage** of New York Bay and the adjacent waters accords with the uniform system adopted in United States waters (see introductory, page 5). Many of the can and nun buoys are replaced by spar buoys during the winter.

Quarantine regulations for the port are changed from time to time as is found necessary by the local authorities. The National Quarantine laws and regulations will be found in Appendix III.

A time ball is dropped daily, except Sunday, in New York City from the Western Union Telegraph Building, 195 Broadway, exactly at noon on the 75th meridian; that is, at 5 h. 0 min. 0 sec. Greenwich mean time. The instant of noon is marked by the beginning of the fall of the ball. A notice is furnished for publication in the New York daily papers stating whether the ball has fallen at the correct time, and giving the amount of error

if there has been any. This time signal is maintained and operated by the Western Union Telegraph Company. The ball is dropped by electric signal from the U. S. Naval Observatory, in accordance with arrangements made under the authority of the Navy Department.

A **Branch of the United States Hydrographic Office**, subordinate to the Navy Department, is established at the Maritime Exchange, Produce Exchange Building. Bulletins are posted here giving information of value to seamen, who are also enabled to avail themselves of publications pertaining to navigation, as well as to get chronometer comparisons, and to correct their charts from standards. No charge is made for this service.

Storm Signals of the U. S. Weather Bureau are displayed in New York City from the Manhattan Building, No. 66 Broadway; they are also displayed at Sandy Hook (see Appendix II). (*See Supplement, Art. 14.*)

Ice.—The large number of ferryboats, towboats, and steamers navigating the waters of this harbor usually keep the channels open, but in severe winters ice seriously interferes with navigation for short periods of time.

For variation of the compass see page 21.

For tides see page 21. A tidal indicator, maintained by the Coast and Geodetic Survey, is erected on the wharf at Fort Hamilton so as to be seen by vessels passing through The Narrows. On this indicator is shown the exact stage of the tide and whether the tide is rising or falling. The arrowhead in the middle of the semicircle when pointing upward indicates a rising tide, and when pointing downward a falling tide. The pointer near the arrowhead points to the height of the tide (in feet), which is indicated by figures on the semicircle, the zero agreeing with mean low water.

CURRENTS—NEW YORK BAY AND HARBOR.

In approaching New York Bar from seaward the flood current, when between Rockaway and Navesink, rarely reaches 1 knot per hour, and runs fair for the entrance—except that it is disposed to press upon the outside shores of Sandy Hook and Coney Island.

The ebb current issuing from the harbor is stronger than the flood even in the low-river season—the excess being never less than ten per cent—except near Coney Island and the outside shore of Sandy Hook, where the flood exceeds the ebb usually.

Observations made under direction of the Coast and Geodetic Survey office have enabled it to deduce the following general rules with regard to currents in New York Bay and Harbor:

The Ebb Current.—In the East Channel and in The Narrows the current reaches its strength at about the southing of the moon, while in the Swash, Main, and Gedney channels it is about 40 minutes earlier.

The Flood Current.—In the Swash, Main, and Gedney channels the strength of the current occurs about 5h., in the East Channel about 6h., and in The Narrows about 7h., after the southing of the moon.

In the Gedney, Main, and Swash channels, high-water slack occurs about 22 minutes after high water at Sandy Hook as given in U. S. Coast and Geodetic Survey Tide Tables; it lasts about 25 minutes, when the current begins to run ebb, and 3h. 40m. after high water at Sandy Hook it reaches its maximum velocity of 2·2 knots per hour.

Low-water slack occurs about 51 minutes after low water at Sandy Hook; it lasts about 25 minutes, when the current begins to run flood, and at 3h. 23m. after low water at Sandy Hook it reaches its maximum velocity of 1·8 knots per hour.

In the Main and Swash channels the flood current starts in on the north side of the channel 30 minutes earlier than on the south side, and the ebb current starts out on the south side of the channel 30 minutes earlier than on the north side.

The currents at half ebb in the Swash Channel set to the eastward strongly.

In the East Channel, high-water slack occurs about 49 minutes after high water at Sandy Hook; it lasts about 25 minutes, when the current begins to run ebb, and at 4h. 23m. after high water at Sandy Hook it reaches its maximum velocity of 2·2 knots per hour.

Low-water slack occurs at 1h. 10m. after low water at Sandy Hook; it lasts about 25 minutes, when the current begins to run flood, and at 4h. 26m. after low water at Sandy Hook it reaches its maximum velocity of 1·9 knots per hour.

In The Narrows, high-water slack occurs about 2h. 0m. after high water at Sandy Hook (or 1h. 30m. after high water at Governors Island); it lasts from 15 to 30 minutes, when the current begins to run ebb, reaching a maximum velocity of 1·5 knots per hour at 4h. 30m. after high water at Sandy Hook.

Low-water slack occurs about 2h. 30m. after low water at Sandy Hook (or 1h. 40m. after low water at Governors Island); it lasts from 15 to 30 minutes, when the current begins to run flood, reaching a maximum of 1·2 knots per hour at 5h. 12m. after low water at Sandy Hook (or 4h. 18m. after low water at Governors Island).

Both ebb and flood currents appear first on the east side of the channel.

In Hudson River off Thirty-ninth street, high water slack occurs about 3h. 8m. after high water at Governors Island; it lasts from 40 to 55 minutes, when the current begins to run ebb, reaching a maximum velocity of 3·1 knots per hour at 6h. 17m. after high water at Governors Island.

Low-water slack occurs about 3h. 3m. after low water at Governors Island; it lasts about 35 minutes, when the current begins to run flood, reaching a maximum velocity of 2·2 knots per hour at 5h. 43m. after low water at Governors Island.

NOTE.—In the path of Hudson River from The Narrows to the Tappan Sea, it is running flood 15 feet below the surface fully 1 hour before the turning from ebb to flood at the surface.

See also the current tables on pages 23, 24.

GENERAL REMARKS.

ON THE APPROACHES TO NEW YORK BAY AND HARBOR FROM SEA.

The Gulf Stream first warns vessels approaching New York from the southeastward by its high temperature—say from 70° to 75° F., between the Latitudes of 36° and 39° N.—the water outside of the stream being about 51° F. in the summer time. The distance from Sandy Hook in a southeasterly direction to the outer edge of the Gulf Stream is about 430 miles and to its inner edge 240 miles. On striking soundings after crossing the stream—say in from 75 to 100 fathoms—a slight diminution of temperature will be perceived, and the water will change in color from a dark to a light blue. Depth is a better indication of position off this part of the coast than the character of the bottom, as the same characteristics may be found in widely different positions; the judicious use of the lead will always give sufficient warning of danger.

To the above means of ascertaining the vessel's position with reference to the coast are to be added several peculiarities in the character of the approaches.

IRREGULARITIES OF DEPTH.

Five Fathom Bank, off Delaware Bay Entrance, with a least depth of 15 feet, lies **ESE.** ½ **E.**, 15½ miles from Cape May Lighthouse. In several places this bank has only 3½ fathoms, but 10 to 15 fathoms will be found just to the eastward of it.

Two buoys mark the shoaler spots of the bank, and two light-vessels (Five Fathom Bank Light-vessel and Northeast End Light-vessel) are moored to the eastward of it as guides to clear it.

Mud Gorge.—The surveys of the sea approaches to New York have developed a continuous channel or ancient river course cut in the sea bed from off Sandy Hook bar out nearly to the ocean basin. The sea bed, for a distance of nearly 100 miles off Sandy Hook, until a depth of 40 to 60 fathoms is reached, is composed of *sand*. In some places the sandy bottom has black specks, in others yellow specks, and again pebbles and broken shells are found in it. The continuous gully cutting to the southeastward through this bed of sand has a bottom of *mud or clay*. Near its outer or seaward end this is a green ooze mixed with sand. Farther in it becomes a blue clay mixed with some sand; but whatever the character of the bottom in particular parts of the gully, its general features are so different from those of the sand bed through which it cuts that there is no room for mistake. It must be borne in mind, however, that the deep channel in which a bottom of mud is found is narrow in places, requiring quick work with the lead to pick it up.

The first indications of this remarkable channel are found about 5 miles to the southeastward of Sandy Hook Light-vessel, where the depth of water is about 19 fathoms. For about 10 miles from this point the channel or gully follows a southerly course, with a width of from ¾ to 1 mile, and a depth increasing gradually from 19 to 33 fathoms between banks over which the depth is the same as that of the adjacent sea bed—about 15 to 18 fathoms. The gully turns more to the eastward in the next 5 miles, after which it has a general direction about **SE.** ⅜ **E.** for nearly 60 miles to a sand bar extending across it. Throughout the second 10 miles the depth remains nearly constant at about 35 fathoms; the banks sink to 22 fathoms below the surface. In the next 15 miles the depth of the gully increases to 42 fathoms, the banks conforming to the change. Thence to the bar, a distance of about 40 miles, the depth in the channel remains about the same—41 to 43 fathoms—while the banks

gradually sink to the same level. The bar, over which the depth is also about 43 fathoms, is near the outer limit of the sand bed already mentioned.

Outside the bar, which is 10 miles wide, the channel is found again as a deep ravine extending to the eastward about 25 miles farther, with a depth of from 200 to about 475 fathoms between banks over which the depth, increasing offshore, is from 45 to 200 fathoms. The average width of this ravine is about 3 miles. Specimens of bottom from it are the same as from its banks and the adjacent flats—a green sandy mud. A narrow ridge, over which the depth is about 200 fathoms, separates the outer end of the ravine from the ocean basin.

Cholera Bank.—This bank, although a comparatively short distance from Sandy Hook Light-vessel and but little elevated above the surrounding bottom, serves by the characteristic soundings (which show rocky bottom) to indicate the navigator's position. It extends in an easterly and westerly direction for several miles, with a depth from 10 to 11 fathoms and an average width **N.** and **S.** of about 1 mile. It bears from Sandy Hook Light-vessel about **SE.** by **E.** $\frac{1}{2}$ **E.**, distant about 10 to 12 miles.

The twenty-fathom line off the Jersey coast also serves as a guide to vessels approaching from the southward in thick weather. If a vessel from the southward, striking 20 fathoms to the northward of Barnegat, steers about **N.** by **W.** $\frac{3}{4}$ **W.**, she would be apt to keep in not less than 20 fathoms and can thus work up toward the light-vessel. Such course will be apt, also, to strike the mud gorge already described, which, with the aid of the chart of the approaches to New York, may be followed up for the light-vessel. Inasmuch as the wind current—owing to the prevailing northeasterly winds—sets to the westward toward the Jersey coast, it will be well, should less than 20 fathoms be obtained before the soundings in mud gorge indicates a near approach to the light-vessel, to haul to the eastward until the water deepens, and then proceed again to the northward. Should the weather continue thick, the ship's head should be put offshore, keeping outside of 20 fathoms until the weather clears.

Soundings on the Long Island and New Jersey Coasts.—Among the irregularities of bottom which serve as indications of a vessel's position when approaching New York Entrance may be mentioned the soundings off the coasts of Long Island and New Jersey. The water shoals very gradually going to the westward toward the latter coast; and very rapidly if standing to the northward toward Long Island. From the peculiar position, also, of the two shores relatively to each other and to the waters of New York Bay, it follows that the course which will deepen the water, if the vessel is on the Long Island side of the approach, will shoal it if she is on the New Jersey coast. This is very important in thick weather. The following rule, based upon the above fact, is safe and reliable: Striking 15 fathoms and in doubt as to position, steer **SW.** by **S.** If the water deepens, the vessel is on the Long Island shore; if it shoals gradually, she is on the Jersey coast. In the former case you may stand off and on, taking care *not* to go inside of 12 fathoms and so work up toward the light-vessel. In the latter case the ship's head should at once be put offshore (as nearly **E.** by **S.** as possible), and you should stand off in that direction until the soundings give 20 fathoms, which is at a safe distance from land. A stranger finding himself on the Jersey coast in thick weather should not attempt to run in toward the light-vessel, but should keep offshore until the weathers clears.

Pilot boats cruise offshore between Fire Island and Barnegat. For information relative to pilots see Appendix I.

CURRENTS.

In approaching from the eastward from the vicinity of Nantucket Shoals Light-vessel a slight allowance should be made for the southwesterly set of the wind current—caused by the prevailing northeasterly winds. Should the wind be to the northward of **E.** it has been customary to allow, in order to make the course good, a set of the current to the southwestward of at least 12 miles in every twenty-four hours. It may be said that the failure to use the lead has caused many vessels to make the Jersey coast to the southward of Sandy Hook instead of making the light-vessel or the southern coast of Long Island. The lead should be used at regular intervals, and when nearing the entrance (say in Longitude 73° 15′ **W.**) soundings should be taken at intervals of 2 miles, the depth from this point until the Sandy Hook Light-vessel is reached being in no place greater than 15 fathoms and ranging as low

as 12. Should the weather be thick and soundings be obtained as low as 10 fathoms, the ships head should be immediately put offshore. Striking soundings in 15 fathoms and in doubt as to position, **SW.** by **S.** should be steered. If the soundings increase, you are on the Long Island shore; if they gradually diminish, you have fallen to the southward of the true course and overrun your distance and are on the Jersey coast. In the former case the ship may stand off and on, taking care not to go inside of 12 fathoms, and so gradually work up toward the light-vessel. In the latter case her head must at once be put offshore (as nearly **E.** by **S.** as possible) until 20 fathoms is reached, as before described.

Observations made between Nantucket and Cape May have developed the existence of weak tidal currents veering around the compass, accompanied by a general drift of the sea to the southwestward amounting to about 7 miles in twenty-four hours.

TIDAL CURRENTS ON SOUTH COAST OF LONG ISLAND.

Under ordinary circumstances the set of the flood is directly along the beach; off Montauk the ebb sets to the southward, and the flood to the northward. Between Shinnecock and Fire Island the ebb sets sometimes to the eastward and sometimes to the northeastward, in the latter case obliquely on to the beach. Between Fire Island and Sandy Hook the current of ebb sets generally to the southeastward; while the flood (especially in the neighborhood of the inlets) has a tendency to set to the northwestward and is quite strong, running from 1½ miles to 2½ miles an hour. The current in the vicinity of Montauk is quite strong, the flood running from 1½ miles to 2 miles an hour, and the ebb being even stronger. Between Shinnecock and Fire Island, however, it rarely reaches the velocity of 1 mile.

In thick weather and during strong winds from the southward—especially southeast snowstorms—we would recommend strangers on this coast under no circumstances to go inside of 15 fathoms, sounding frequently.

Tidal currents on the coast of New Jersey, when uninfluenced by the winds, as a general rule, follow the trend of the shore except close in near the entrance of the several inlets, where the current of flood sets inshore and that of ebb offshore.

In thick or foggy weather, when the ship's reckoning indicates that she is near the Jersey coast, great care should be taken to make frequent and accurate soundings with an armed lead. The soundings are not sufficiently characteristic along this part of the coast to make it possible to give precise rules for determining the ship's position by the depth of water or character of the bottom. There is, however, one rule which, if strictly adhered to, will keep the vessel out of danger until the weather clears and her position can be accurately determined, viz: Should at any time a sounding of 10 fathoms or less be obtained, the course should be immediately changed to the eastward until the water deepens to 14 fathoms; after which care should be taken to keep outside of that depth.

In beating to windward in thick weather, vessels on the inshore tack, to the southward of Barnegat, should go about as soon as they strike 10 fathoms; and when to the northward of Barnegat as soon as they strike 11 fathoms. A stranger overtaken by thick weather when, from his reckoning and the character of the soundings, he has reason to believe he is too near the coast, should put the ship's head offshore and stand off and on under easy sail, taking frequent soundings.

SAILING DIRECTIONS, NEW YORK BAY AND HARBOR.

General remarks on approaches, etc., to New York Harbor are given on pages 29–31.

The channels leading across the bar at the entrance to New York Lower Bay are described on page 26. The sailing directions for these channels are given in sections in the order of their importance. No directions for the Fourteen Feet Channel are given as it is not buoyed and can only be used by light-draft vessels whose masters are well acquainted with it.

In following the sailing directions reference should be made to the "Table of Lights" on pages 10, 12 for description of them and the location of the ranges.

Strangers should not attempt to enter the harbor in thick weather.

It should be remembered that in this harbor and vicinity the bell, nun, and can buoys are generally replaced during the winter season by spar buoys.

1. *Entering Through Gedney and Main Channels.*—Steer **WNW. ¼ W.** from Sandy Hook Light-vessel and pass close to Gedney Channel whistling buoy.

Continue the **WNW. ¼ W.** course, passing between the buoys (lighted by electricity at night) marking Gedney Channel until abreast of buoy No. E 7, when the vessel should be on the Main Channel range (Point Comfort beacon in range with Waackaack beacon). Now change the course to **W.** by **S.** and stand in through the Main Channel, keeping on the range.

Remarks.—On the **WNW. ¼ W.** course the high Centennial Tower on Coney Island will be seen to the northwestward, Romer Shoal Lighthouse (see table, page 10) will be a little on the starboard bow, Staten Island ahead, and North Hook beacon, South beacon, and Sandy Hook Lighthouse will be on the port bow, Gedney Channel whistling buoy (black and white perpendicular stripes) will be passed close-to and the buoys marking Gedney Channel will be made ahead; on the north side of the channel are a red first-class nun buoy (No. 2 G E) and four red spar buoys, Nos. E 2, E 4, E 6, and E 8, having red electric lights at night, and on the south side are, a black first-class can buoy (No. G) and four black spar buoys, E 1, E 3, E 5, and E 7, with white electric lights at night.

On the **W.** by **S.** course a number of buoys will be passed, the color and number indicating on which side they are to be left. If the range can not be seen and followed, give the two red buoys, one with perch and square, on the starboard hand, a berth of 300 yards. The course leads about ¼ mile to the northward of the black bell buoy on the shoal, making out ⅝ mile in a northeasterly direction from Hook beacon.

For a description of the lighthouses and ranges see table, page 10.

Dangers.—*North of the red buoys* of Gedney Channel there is a shoal, with 14 to 23 feet of water, extending northward to the East Channel, and westward connecting with Romer Shoal (see description, page 34).

South of the line of black buoys of Gedney Channel, between it and South Channel, there is 20 to 27 feet of water.

Flynns Knoll, lying north of the Main Channel, is a sand shoal 1 mile long **WNW.** and **ESE.** and has from 10½ to 17 feet of water over it. At its western end it sends off a spur known as **Southwest Spit**, ½ mile long, with from 13½ to 17 feet over it.

2. *Around Southwest Spit.*—Standing in on the **W.** by **S.** course, as directed in section 1, preceding, after the North Hook beacon is passed, South Hook beacon and Sandy Hook Lighthouse will gradually come in range. As soon as they are in range, bearing **SE.** by **E. ¼ E.**, steer **NW.** by **W. ¼ W.** and keep the range for a little over ½ mile; the vessel should then be near Southwest Spit buoys (nun, red, with perch and ball, and a red spar buoy near it which has a red electric light at night) and nearly on the Chapel Hill Range (see page 10), a black spar buoy showing a white electric light should be ahead, distant about 400 yards. As soon as Conover beacon and Chapel Hill beacon are in range, bearing **S.** by **W. ¼ W.**, bring them over the stern and steer **N.** by **E. ¼ E.**, keeping the range, and following the directions under section 3 following.

In beating, do not go north of the line of buoys south of Flynns Knoll and Southwest Spit.

Remarks.—The North Hook beacon is at the northern extremity of Sandy Hook and will be about 2 points on the port quarter when South Beacon and Sandy Hook Lighthouse come in range, and Conover and Chapel Hill beacons (often difficult to pick up) will then bear about **SSW. ¼ W.**

The lighthouses and beacons are described in the table on page 10.

Several red buoys will be seen to the northward, which should be given a berth of ¼ mile, and the western one, surmounted by a perch and ball, marks the turning point into Chapel Hill Cut, and should be left about 200 yards on the starboard hand.

Dangers.—**Flynns Knoll** and **Southwest Spit** are described under section 1 preceding.

There is 25 feet of water about 500 yards to the westward of red buoy No. 12 (with perch and ball) and just to the westward of Chapel Hill range a black buoy showing a white electric light is placed on the western edge of the channel at this place and should be left on the port hand.

3. *Up the Bay.*—When Conover and Chapel Hill beacons are in range, bearing **S.** by **W. ¼ W.**, steer **N.** by **E. ¼ E.** until above Hoffmann Island, following the buoyed channel on this course, and keeping the range while visible, until Coney Island Lighthouse (on western end of Coney Island, see page 12) bears **SE.** by **E. ¼ E.**, then follow the directions under section 4 following.

In beating, be guided by the chart and the buoys.

Remarks.—A number of buoys will be passed, the color and number indicating on which hand they are to be left.

A white buoy lying about ⅝ mile to the northwestward of buoy No. C 5 is not to be considered.

Entering as directed, the Junction buoy (nun, red and black horizontal stripes, surmounted by a perch and square) at the western end of Swash Channel, will be left about 300 yards on the starboard hand.

Romer Shoal Lighthouse will be left about 1⅜ miles on the starboard hand.

Swinburn Island and Hoffmann Island, to the westward of the course, are low artificial islands on the shoalest part of West Bank, with several buildings upon them.

Coney Island Lighthouse (see page 12) will be left 1 mile on the starboard hand, and farther to the eastward the high tower on Coney Island is prominent.

Following the course up the bay, Fort Tompkins and the lighthouse named from it will be seen on the hills on the western shore of The Narrows. On the opposite shore is Fort Hamilton, off which is Fort Lafayette, low and circular in shape (here there is a fog signal, but no light. See page 12).

Dangers.—**Flynns Knoll** is described on page 32.

East Knolls, separating the Main and Swash channels, has from 10½ to 16 feet of water over it, and is about 1½ miles long **NNW.** and **SSE.** and ⅜ mile wide.

West Knolls, to the westward of the channel, nearly abreast East Knolls, is about ⅞ mile long **NNE.** ½ **E.** and **SSW.** ½ **W.**, with 15 feet over it, and over 3 fathoms on all sides.

Romer Shoal is described on page 34.

Staten Island Flats make off from the eastern shore of that island from 1¾ to 2⅝ miles, with depths over them from 1 to 16 feet. Round Shoal, Old Orchard Shoal, and West Bank are parts of these flats.

West Bank, which limits the western side of the Main Channel, forms the northeastern part of Staten Island Flats and make off in a **S.** ¼ **W.** direction from Fort Tompkins for a little over 3 miles. It has from 1 to 10 feet over it. Its eastern side is bold-to, but is well marked by black buoys and by Swinburn and Hoffmann islands, neither of which should be approached closer than ⅜ mile.

East Bank, an extensive sand shoal, extends to the southward from Coney Island and has from 3 to 18 feet of water over it. The shoal lumps are scattered all over the bank, and care is necessary when near it. In passing it, to keep clear, do not bring Fort Lafayette on any bearing to the westward of **N.** ½ **W.**

4. ***Through The Narrows.***—When Coney Island Lighthouse bears **SE.** by **E.** ¼ **E.** (Fort Tompkins Lighthouse bearing **NW.** by **N.**), steer **N.** by **W.** through The Narrows to abreast of Tompkinsville and then follow the directions in section 5 following:

If beating do not go to the westward of the black buoys marking West Bank, or to the eastward of a line joining Fort Lafayette and Coney Island Lighthouse.

Remarks.—On the **N.** by **W.** course Robbins Reef Lighthouse will be nearly ahead and may be steered for.

The towns of Clifton and Stapleton, on Staten Island, will be passed, and the course leads up to abreast Tompkinsville. When past Fort Lafayette do not go to the eastward of a line joining it and Robbins Reef Lighthouse, until within 1 mile of the latter, in order to keep clear of the point of the shoal making to the southwestward from Gowanus Bay.

Dangers.—**Craven Shoal** will be left on the port hand; this is a detached lump with 18 feet over it, lying 1 mile **SSE.** from Fort Tompkins Lighthouse. On its eastern side is a buoy painted red and black in horizontal stripes.

There are no dangers in The Narrows if the eastern shore be given a berth of ¼ mile.

5. ***From Tompkinsville to New York.***—The course from off Tompkinsville is about **NE.** by **N.**, carrying not less than 5 fathoms of water. If intending to anchor, conform to the limits prescribed in Appendix I.

Remarks.—Directly ahead is New York City, at the extreme lower end of which is the Battery. The **Brooklyn Bridge** and **Governors Island** are prominent on the starboard bow. On the port bow are Bedloe Island and Ellis Island. The highest point of the collossal statute "**Liberty Enlightening the World**," on Bedloe Island, is more than 300 feet above the water and has an electric light visible about 24 miles.

A little to the southward of Bedloe Island there is a dredged channel, with a depth of 25½ feet, leading in to Clearmont wharves. This channel is narrow and is marked by buoys. On the western side of the channel between Stapleton and the Battery are a number of white buoys which mark the anchorage limits.

Dangers.—The channel is unobstructed; the dangers limiting it are **Gowanus Flats** and **Governors Island Shoal** on the starboard hand and on the port hand the **Jersey** (or **Bergen**) **Flats.** Several buoys will be passed—red ones on the starboard hand, blank ones on the port hand.

Gowanus Flats, with from 7 to 18 feet of water over them, make off in a southwesterly direction for 2½ miles from Red Hook (the northern point of entrance to Gowanus Bay). Gowanus Flats southwest end buoy (bell, red) lies a little over 1 mile **SE.** by **S.** from Robbins Reef Lighthouse, and to the eastward of the course up the bay and to the westward of the entrance of Gowanus Bay. A long pocket with from 3 to 7 fathoms of water makes in along the eastern side of the flats. The **NW.** corner of Governors Island (low circular fort with light, see page 12) bearing to the eastward of **NE.** by **N.** gives these flats a good berth.

Jersey Flats are very shoal, being bare in places, with a ruling depth of 3 to 6 feet. **Robbins Reef** and **Oyster Island Flats** form parts of this shoal ground. The eastern edge of the flats is marked by Robbins Reef Lighthouse, Bedloe Island, Ellis Island, and a number of black buoys.

Governors Island shoal bell buoy (black) is left on the starboard hand going up the main channel; it is at the lower end of the shoal making off to the southwestward from the island. The depth just inside the buoy is 17 feet, decreasing toward the island; and for a distance of ¼ mile to the southwestward of the buoy the shoal has a depth of 23 feet and less.

Governors Island is occupied by Fort Columbus, and here are the headquarters of the military division of the Atlantic, commanded by a general officer of the Army.

1 A. ***Entering through Gedney and Swash channels.***—Follow the directions in section 1, page 32, until red buoy No. B 2, with perch and square, is on the starboard beam, then haul to the northward and bring Elm Tree and New Dorp beacons (see page 10) in range bearing **NW. ⅜ N.** Keep this range (passing about 400 yards to the southward of Romer Shoal Lighthouse) until past the red bell buoy at the western end of Swash Channel. Now change course to **N.** by **E. ¼ E.** (Conover and Chapel Hill beacons in range astern) and when Coney Island Lighthouse bears **SE.** by **E. ¼ E.** follow the directions in section 4, page 33.

Remarks.—On **NW. ⅜ N.** course Scotland Light-vessel will be directly astern, Romer Shoal buoys (nuns Nos. S 2 and S 4) and Romer Shoal Lighthouse will be left on the starboard hand, and black buoys (Nos. S 1 and S 3), also a red and black and horizontally striped buoy, will be left well on the port hand.

At the western end of the Swash Channel, besides the red bell buoy (on the northern side), there is a junction buoy (red and black horizontal stripes, surmounted by a perch and square) on the southern side of the channel at its junction with the main channel up the bay.

The currents of half ebb in the Swash Channel set to the eastward strong, and care must be taken not to be drifted on to Romer Shoal.

Dangers.—The dangers to the southward of Swash Channel are described on page 32.

Romer Shoal, with 3 to 18 feet over it, extends about 3½ miles in a northwesterly and southeasterly direction, and lies between Swash Channel and East Channel. It is well marked by buoys and by Romer Shoal Lighthouse, which is near the center, on the Swash Channel side.

1 B. ***Entering through South and Swash channels.***—From Scotland Light-vessel steer **NW. ⅜ N.**, passing close to the two mid-channel buoys (black and white perpendicular stripes) and keeping Elm Tree and New Dorp beacons in range until between the bell buoy (red) and the junction buoy (red and black horizontal stripes with perch and square) at the western end of Swash Channel. Now change the course to **N.** by **E. ¼ E.** and stand up the bay, following the directions in section 4, page 33.

Remarks.—In crossing the Main Channel, from South to Swash channel, black buoy No. B 1 and red buoy No. B 2 will be left on the starboard hand and Palestine Shoal buoy (red and black horizontal stripes) on the port.

See Remarks and Dangers under section 1 A, preceding. See also currents, on page 28.

1 C. ***Entering through East Channel.***—This channel is not much used; it is not safe for vessels drawing over 17 feet, even with a smooth sea, and should not be attempted by strangers. Keep the Centennial Tower on Coney Island bearing to the westward of **N.** by **W. ½ W.** until Romer Shoal Lighthouse bears **W. ¾ N.** Run for this lighthouse on this bearing until Sandy Hook Lighthouse bears **SSW. ⅛ W.** and then change the course to **NW.**, leaving the black buoys on the port and the red buoys on the starboard hand. When red buoy (No. 6) bears about **N.** haul to the northward, pass to the westward of it, and steer **N. ½ W.** until Coney Island Lighthouse bears **SE.** by **E. ¼ E.**, then follow the directions under section 4, page 33.

Remarks.—Although this channel is buoyed, strangers should not use it.

Allowance must be made for the currents; the flood sets toward Romer Shoal, the ebb toward East Bank.

The **W. ¾ N.** course leads about ¼ mile north of black buoy No. 1 and nearly directly for black buoy No. 3; the course is changed to **NW.** when about midway between these buoys. The three red buoys (Nos. 2, 4, and 6) marking the northern edge of the channel are gas-lighted, and each shows a fixed red light at night.

Dangers.—**Romer Shoal**, described above, forms the southern limit of the channel, and a part of **East Bank** rises abruptly on the northern side of the channel.

1 D. ***Entering through False Hook Channel.***—This channel has a least depth of 19 feet, but it should not be attempted by vessels drawing over 16 feet or by strangers. With Navesink Lighthouses bearing to the westward of **WSW.** bring Sandy Hook Lighthouse to bear **NNW. ¾ W.** and run for it. This course will lead about 400

yards to the westward of Outer Middle Ground buoy (spar, red, No. 2) near the entrance. When this buoy bears **E.**, distant about 400 yards, steer **N.** by **W.** ½ **W.** and pass 200 to 300 yards to the westward of **The Oil Spot** buoy (spar, red, No. 4). Continue the **N.** by **W.** ½ **W.** course nearly parallel to the beach until North Hook beacon bears **W.** by **N.**, then change course to **NNE.** ½ **E.** passing to the northward of False Hook Shoal buoy (nun, red and black horizontal stripes) and close to the westward of Bayside Range Cut buoy (can, black, No. B 3) and out into the Main Channel. Now turn to the westward and enter through the Main Channel (see directions, section 1, page 33) or continue **NNE.** ½ **E.** until on the Swash Channel Range and enter as directed, section 1 B, page 32.

Remarks.—On the **N.** by **W.** ½ **W.** course the eastern shore of Sandy Hook will be given a berth of about ¼ mile, but it may be approached with safety to within ⅛ mile.

Dangers.—**Outer Middle Ground**, with 18 to 21 feet over it, **Oil Spot**, with 10 to 19 feet over it, and **False Hook Shoal**, with 16 to 18 feet over it, lie to the eastward of the channel (between it and South Channel) in a **NNW.** and **SSE.** direction, and are inclosed by five buoys, two red buoys on the western side, two black buoys on the eastern side, and a buoy (red and black horizontal stripes) at the northern end of False Hook Shoal, about **E.** ¾ **S.** from North Hook beacon.

A **shoal** with 11 to 17 feet over it makes out for about ⅝ of a mile in a northeasterly direction from North Hook beacon. Its northeastern extremity is marked by a black bell buoy, which should be given a berth of at least 450 yards while to the southward of it.

RARITAN BAY*

is the part of New York Lower Bay lying to the westward of Point Comfort and to the southward of Staten Island. To the northward of Point Comfort the bay is about 4½ miles wide, and it extends, becoming gradually narrower, about 6 miles to the westward. It is the approach to Matawan Creek, Arthur Kill, and Raritan River (see descriptions following). The bay is full of shoals, with depths of 7 to 18 feet over them, but the channel into Raritan River and Arthur Kill, which leads along the southeastern shore of Staten Island, is connected with the deep water of the bay by a dredged channel originally 250 feet wide and 21 feet deep, but this channel is now somewhat narrower; this channel is well buoyed and can be used by strangers in the daytime as far as Perth Amboy, South Amboy, or Tottenville. The direct channel over the shoals is only good for a depth of about 11 feet, and is used by small vessels and towboats. (*See Supplement, Art. 15.*)

Matawan Creek empties into Raritan Bay from the southward, the entrance of the creek being 3¾ miles **S.** from Princess Bay Lighthouse. **Matawan**, a village about 2 miles above its mouth, can be reached by vessels of 3 feet draft at low water. **Keyport**, a village at the entrance, is the terminus of a branch railroad; the long railroad wharf on the eastern shore of the entrance to the creek is a prominent mark. A dredged channel about 7¾ feet deep and about 100 feet wide leads from Raritan Bay to the steamboat wharf at Keyport. Improvements are in progress to maintain a depth of 8 feet in this channel. (*See Supplement, Art. 15.*)

The sailing directions for Raritan Bay can be followed as far as Conaskonk Point Shoal buoy. From this a **SSW.** ½ **W.** course for 1¾ miles leads up to the entrance, where a pilot should be taken.

Prominent objects.—Old Orchard Shoal Lighthouse is one of the guides for Raritan Bay when standing in from New York Lower Bay. **Princess Bay Lighthouse**, and the reddish colored high bank on which it stands, will be conspicuous when standing for the dredged channel. A large factory with a prominent spire (cupola) is on Seguine Point, and is the mark to steer for while standing through the dredged channel. To the southward of Princess Bay Lighthouse on the shoals, about midway between Staten Island and the shore to the southward, is the boundary beacon, and to the westward off the southwestern end of Staten Island is **Great Beds Lighthouse.** The village of Keyport will be seen in the bight on the south shore, bearing **S.** from Princess Bay Lighthouse. **Ward Point**, the southwestern point of Staten Island, has a few small white houses near its end, and the point is partially protected from the action of the sea by sheet piling, which at a distance resembles a dock.

Pilots.—Pilotage for ports in the states of New York and New Jersey is compulsory for certain vessels (see pilotage laws in Appendix I). Pilots for New York Bay have authority, and sometimes bring vessels in to Perth Amboy and South Amboy. If a vessel in New York Lower Bay wants a pilot for those ports or through Arthur Kill, she should hoist the pilot signal and anchor anywhere in Raritan Bay to the westward of Southwest Spit, or off the entrance to the dredged channel. As soon as the signal is seen a pilot will come off either from Perth Amboy or Seguine Point. Vessels bound up the Raritan River, and desiring a pilot, can get one at Perth Amboy.

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*Shown on charts **369**, scale $\frac{1}{40,000}$, price $0.75; **375**, scale $\frac{1}{20,000}$, price $0.50.

Towboats are used by the larger vessels, and by all but very small craft, bound up the Raritan River and Arthur Kill, they can be had by making signal off the entrance to the dredged channel, and are often found cruising in the lower bay, inside Sandy Hook.

Harbor regulations.—There are no special harbor regulations; the harbor masters at Perth Amboy and New Brunswick see that the channels in their respective harbors are kept clear for passing vessels.

Quarantine regulations.—The practices of the quarantine officer for New York Harbor are usually followed. The Board of Health at Perth Amboy makes regulations for the port and appoint the health officer. Vessels subject to visitation are boarded off Ward Point, above which no vessel should pass until boarded by the health officer or his deputy. (See also the National Quarantine Laws in Appendix III.)

The **U. S. Marine Hospital** at Stapleton, Staten Island, receive seamen entitled to treatment.

Supplies.—Coal in quantities for steamers, and water, can be had at the wharves in Perth and South Amboy. Provisions and ship chandler's stores can be had at Perth and South Amboy, Tottenville, and New Brunswick.

Repairs.—See description of Perth Amboy, Tottenville, and New Brunswick following.

Ice.—In ordinary winters ice does not seriously interfere with navigation in Raritan Bay or Arthur Kill; but in severe winters the ice sometimes prevents the movements of vessels for periods of two weeks at a time. In easterly winds the drift ice in New York Lower Bay collects in Raritan Bay and obstructs navigation, but usually only for a short time, as the prevailing westerly winds drive the ice out of the bay. The Delaware and Raritan Canal is closed to navigation in winter.

Tides.—High water at Key port and Great Beds Lighthouse occurs about 10 minutes after high water at Sandy Hook. The mean rise and fall at the two places being 5·6 feet, and 5·4 feet respectively (see tidal data for Sandy Hook on page 21).

ARTHUR KILL,*

the narrow body of water separating Staten Island from New Jersey, is the southern approach to Elizabethport and the approach to Rahway River and Woodbridge Creek. Near its southern entrance, on the Staten Island side, is the town of **Tottenville**, and on the New Jersey side, the town of **Perth Amboy.** A draft of 12 feet can be taken through Arthur Kill at low water, but in places the channel is very narrow and it requires local knowledge to keep in the best water. The B. & O. R. R. bridge crosses a short distance below Elizabethport; the draw is wide enough for the largest vessels (206 feet). *(See Supplement, Art. 15.)*

Elizabethport is described under the heading "Newark Bay."

Rahway River empties into Arthur Kill from the westward about 6½ miles above Tottenville. The river is only used by small craft at high water, when a depth of 5 feet can be carried nearly up to the town of **Rahway,** 5 miles above its mouth.

Woodbridge Creek empties into Arthur Kill from the westward, about 1½ miles above Tottenville. About 7 feet at high water can be taken to the town dock of the village of Woodbridge, which is nearly 2 miles above the mouth of the creek.

Tottenville, a small town on the southwestern end of Staten Island, is of little commercial importance, but has a number of shipyards and marine railways, mostly for building and repairing vessels of less than 500 tons register. The largest railway is about 126 feet long, 36 feet broad, and capable of hauling out vessels of 10 feet draft.

Perth Amboy is on the point at the junction of Raritan River and Arthur Kill, at the western end of Raritan Bay; the principal wharves being situated along the shore of Arthur Kill. The larger class of coasting vessels and many foreign vessels bring to, and take cargoes from, Perth Amboy. The deepest draft entering is 23 feet; 18 feet can be taken in at low water, and 20 feet alongside some of the wharves. The larger vessels employ towboats in New York Bay when entering; those coming or going by the way of Long Island Sound pass through Kill Van Kull and Newark Bay, and those bound to and from Sandy Hook, through Raritan Bay. There is good anchorage abreast the wharves in about 6 fathoms water where vessels are anchored under the direction of the harbor masters. There are three floating dry docks at Perth Amboy, the largest is 229 feet long, 60 feet wide inside, and will take a draft of 17 feet; the other two are 159 and 130 feet long, respectively. The facilities for repairs to hulls of vessels are excellent. High water is about 13 minutes and low water 8 minutes later than at Sandy Hook, and the mean rise and fall of tides is 5·4 feet.

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*Shown on charts **369,** scale $\frac{1}{40,000}$, price $0.75; **120,** scale $\frac{1}{80,000}$, price $0.50.

RARITAN RIVER*

empties into the extreme western part Raritan Bay to the southward of Arthur Kill. The river is navigable for a distance of 10½ miles to the city of New Brunswick, which is the eastern terminus of the Delaware and Raritan Canal. **Sayersville,** on the south bank, about 5 miles above its mouth, and **Washington,** on the South River, a tributary of the Raritan River, are villages which ship large quantities of brick in small vessels. Just above its mouth the river is crossed by a drawbridge of the Central R. R. of New Jersey. Improvements are in progress, under the supervision of the U. S. Engineers, to make a channel 200 feet wide and 10 feet deep, at low water, up to New Brunswick; at present (1897) a depth of about 8 feet at low water can be taken up to within 350 yards of the canal basin and 10 feet to the canal basin, at high water. The channel is narrow and crooked. The dredged channels shoal after every freshet in the river; it requires some local knowledge to keep in the best water. The deepest draft of the vessels navigating the river above South Amboy is about 8 feet.

The Delaware and Raritan Canal is 44 statute miles long, has a depth of 7 feet, and thirteen locks which are 210 feet long and 23 feet 4 inches in width. Its eastern terminus, New Brunswick, has a basin along the wharves in which there is a depth of 7 to 8 feet at all stages of the tide. The western terminus is at Bordentown, on the Delaware River, about 23 miles above Philadelphia. The principal places on the canal and their distance, in statute miles, from New Brunswick, are: Bound Brook, 8 miles; Millstone, 14 miles; Kingston, 24½ miles; Trenton, 37 miles; Bordentown, 44 miles. The deepest draft permitted through the canal is 7 feet. At one place telegraph wires cross the canal on poles 110 feet high; this is the only place that masted vessels (having masts over 105 feet high) would be obliged to house masts.

The city of **New Brunswick** has little commerce except that passing through the canal. There are four small marine railways here about 100 feet long and 30 to 35 feet broad, capable of hauling out vessels of 6½ feet draft.

South Amboy, a town at the mouth of the Raritan River opposite Perth Amboy, has considerable trade by water. Shoals somewhat obstruct the entrance to the river, but a channel 100 feet wide and 19½ feet deep has been dredged from the deep-water channel near Great Beds Lighthouse to the wharves at South Amboy. About 18 feet is the deepest draft which can be taken to the wharves at low water; the larger class of vessels usually take a towboat when bound to South Amboy. (*See Supplement, Art. 15.*)

Tides.—At New Brunswick high water is 54 minutes later and low water 2 hours 2 minutes later than at Sandy Hook; the mean rise and fall of tides is 6·8 feet. For tides at Great Beds Lighthouse see page 21.

SAILING DIRECTIONS, RARITAN BAY TO PERTH AMBOY, TOTTENVILLE, AND SOUTH AMBOY.

Strangers should not attempt to enter at night unless of light draft.

I. ***Vessels of 23 feet draft, at high water.***—Enter New York Lower Bay as directed in section 1, page 29. When on the **W.** by **S.** course, Sandy Hook Lighthouse and South beacon come in range, steer **NW.** by **W.** ⅞ **W.**; this course made good for 6 miles will lead to the entrance buoy of the dredged channel.

Or, having come down New York Bay by the Main Channel, when Old Orchard Shoal Lighthouse bears **NW.** by **W.** steer **WNW.** ⅞ **W.** leaving black can buoy (C 3) on the starboard hand; this course continued for nearly 5¼ miles leads up to the entrance buoy of the dredged channel.

Leave the entrance buoy (black No. 1) about 30 yards on the port hand and steer **NW.** by **W.** ½ **W.** for the cupola of the factory on Seguine Point, taking care to pass on the proper side of the buoys. When about ¼ mile from Seguine Point and past black buoy No. 3, steer **W.** a little over ¾ mile, and pass about 100 yards to the northward of black buoy No. 5. From this buoy steer **SW.** ⅞ **W.** leaving red buoys Nos. 6 and 8 on the starboard hand. Pass about 100 yards to the eastward and southward of buoy No. 8 and steer about **WNW.** ½ **W.** so as to leave black buoy No. 7 about 75 yards on the port hand; then steer about **N.** by **W.** ¾ **W.**, leave red buoy No. 10 on the starboard hand and a red and black horizontally striped buoy on the port hand; continue the course from the latter buoy about ⅝ mile and then haul a little more to the northward, so as to pass about 150 yards to the eastward of a red and black horizontally striped buoy about 1 mile above Great Beds Lighthouse. Anchor in mid-channel to the northward of this buoy in 5 to 6 fathoms water.

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*Shown on chart 375, scale $\frac{1}{20,000}$, price $0.50.

Remarks.—On the **NW.** by **W.** $\frac{7}{8}$ **W.** course Princess Bay Lighthouse should be made a little on the port bow and the large factory on Seguine Point should be a little on the starboard bow; the dredged channel entrance buoy should be made ahead. The sailing line passes $\frac{1}{2}$ mile to the northward of Point Comfort Shoal buoy (black, No. 1).

On the **WNW.** $\frac{7}{8}$ **W.** course, Princess Bay Lighthouse will be a little on the starboard bow and the dredged channel entrance buoy will be made ahead. The sailing line leads about 1 mile to the southward of Old Orchard Shoal Lighthouse.

When on the **NW.** by **W.** $\frac{1}{2}$ **W.** course through the dredged channel, care should be taken to follow the buoys. The cupola (spire) of the large factory on Seguine Point will be ahead and Princess Bay Lighthouse well on the port bow.

After passing black buoy No. 3, the course leads nearly for Princess Bay Lighthouse, which should be kept a little on the starboard bow, and when black buoy No. 5 is passed, a sharp lookout should be kept for red buoy No. 6, which is on the edge of the shoals making off to the eastward from Ward Point. After passing this buoy look out for red buoy No. 8, which is on the southeastern edge of the shoal. The deep water channel between Princess Bay Lighthouse and red buoy No. 8 is only 150 yards wide in some places. After passing red buoy No. 8, the **WNW.** $\frac{1}{2}$ **W.** course leads to the northward of black buoy No. 7, and Great Beds Lighthouse will be on the starboard bow.

On the **N.** by **W.** $\frac{3}{4}$ **W.** course, the red buoy (No. 10) should be left about 50 yards on the starboard hand and the red and black horizontally striped buoy about 50 yards on the port hand. Above this buoy, for a distance of $\frac{3}{4}$ mile, the channel is narrow, leading between Ward Point and a middle ground with 6 to 16 feet of water over it. The red and black horizontally striped buoy about 1 mile to the northwestward of Great Beds Lighthouse is on the northern end of this middle ground; above this the channel is clear to Tottenville and the upper wharves of Perth Amboy.

II. ***Vessels of 9 feet or less draft.***—From Southwest Spit buoy steer **WNW.** $\frac{1}{2}$ **W.** about $3\frac{3}{4}$ miles until $\frac{1}{4}$ mile **N.** of Point Comfort Shoal buoy (black, No. 1). Then steer **W.** $\frac{1}{2}$ **N.** about $2\frac{1}{4}$ miles, with Great Beds Lighthouse ahead, and leave Conaskonk Point Shoal buoy (black, No. 3) $\frac{1}{4}$ mile on the port hand.

Or, coming down New York Lower Bay, pass to the southward of the Wreck of Quickstep bell buoy (black) and steer **WSW.** nearly $7\frac{1}{2}$ miles, and so as to leave Old Orchard Shoal Lighthouse $\frac{3}{8}$ mile on the port hand, and Old Orchard Shoal buoy (red, No. 2) about 400 yards on the starboard hand. Conaskonk Point Shoal buoy (black, No. 3) should then be $\frac{1}{4}$ mile on the port beam.

When Conaskonk Point Shoal buoy is about $\frac{1}{4}$ mile distant to the southward, bring Great Beds Lighthouse to bear **WNW.** $\frac{3}{4}$ **W.** and steer for it on this bearing; when the lighthouse is about 1 mile distant ahead, haul a little more to the westward, so as to pass to the southward of red buoy No. 8. After passing this buoy, head up for the lighthouse again and when it is 350 yards distant steer **NNW.** When about 150 yards from the wharves at Perth Amboy, haul to the northward and anchor anywhere in mid-channel to the northward of the red and black horizontally striped buoy, on the north end of the Middle Ground.

Remarks.—The least water found while following the directions is while standing for Great Beds Lighthouse on the **WNW.** $\frac{3}{4}$ **W.** course which leads across a shoal with 11 feet at low water and passes $\frac{1}{2}$ mile north of the boundary beacon between New York and New Jersey.

When standing on the **WSW.** course from the Wreck of Quickstep bell buoy, Old Orchard Shoal Lighthouse will be left $\frac{3}{8}$ mile on the port hand, Old Orchard Shoal buoy (red, No. 2) nearly $\frac{1}{4}$ mile on the starboard hand, and the dredged channel entrance buoy (black, No. 1) about $\frac{3}{8}$ mile on the starboard hand.

If bound to South Amboy.—I. ***Vessels of 18 feet draft at high water.***—Follow the directions in paragraph I, page 37, until up to black buoy No. 7. Leave this buoy on the port hand, and when a **W.** $\frac{1}{2}$ **N.** course will lead 200 yards to the southward of Great Beds Lighthouse and directly for the black buoy which lies about $\frac{3}{8}$ mile to the westward of the lighthouse, steer **W.** $\frac{1}{2}$ **N.** Leave the black buoy (No. 9) about 20 yards on the port hand and haul up to a **NW.** course, heading for the left draw in the railroad bridge; anchor in mid-channel about 100 yards from the wharves below the bridge.

Remarks.—The **W.** $\frac{1}{2}$ **N.** course leads into the dredged channel and care should be taken not to be set off the course by the current. Black buoy No. 9 is on the south edge of the dredged channel, at the elbow, where the channel turns more to the northward to enter the river. As soon as the center pier of the railroad bridge bears **NW.** the course should be changed for it and should lead about 100 yards from the ends of the wharves at South Amboy.

II. ***Vessels of 9 feet or less draft.***—If not desiring to enter by the dredged channel off Seguine Point, follow the directions in paragraph II, above, and when nearly up to Great Beds Lighthouse steer so as to pass about 200 yards to the southward of it on a **W.** $\frac{1}{2}$ **N.**

course. When the central pier of the railroad drawbridge bears **NW.**, and black buoy No. 9 is about 20 yards on the port beam, steer for the draw in the bridge and anchor off the wharves of South Amboy, or if bound into Raritan River, continue the course up to the draw. Local knowledge is necessary to navigate the river above the bridge.

Vessels bound up the Raritan River through the draw should carefully watch the current, which sets diagonally through the draw of the railroad bridge.

KILL VAN KULL AND NEWARK BAY.*

Kill Van Kull connects New York Upper Bay with the southern end of Newark Bay, and separates the southern shore of Bergen Neck from Staten Island. It is about 3½ miles long, 500 yards wide, and has an average depth of over 6 fathoms; the least depth in the channel is 25 feet found about 1¾ miles from its western end near Factoryville. The entrance from New York Upper Bay, marked on its northern side by **Robbins Reef Lighthouse,** is between the northeastern end of Staten Island and the extensive flats which make off to the eastward from Bergen Neck. **Constable Hook** on the north shore of the Kill is an important point for the shipment of mineral oil. **Bergen Point**, also on the north shore, has some coasting trade. The towns on the south shore, **New Brighton, Factoryville, Port Richmond,** and **North Shore**, are of little commercial importance. Port Richmond has two floating dry docks and a large shipyard.

NEWARK BAY

lies just to the westward of **Bergen Neck** (the long neck of land between it and New York Upper Bay), and is about 5 miles long in a general **NE.** and **SW.** direction, and 1¼ miles wide. It is connected with the southern part of New York Upper Bay by Kill Van Kull, and with Raritan Bay by Arthur Kill, and is entered at its northern end by Hackensack and Passaic rivers.

Two railroads cross the bay, one near its southern and one near its northern end; the southern has a bridge with a draw about 70 feet in width, and the northern a bridge with a draw over 100 feet in width. The greater part of the bay is very shoal; the depth in the channel, which runs along nearly in the middle of the bay, ranges from 5 to 11 feet, but 9 feet at low water may be carried through by those having good local knowledge of it. At the southern end of the bay there is a narrow channel with a least depth of 19 feet, extending about 1⅞ miles to the northward from the western end of Kill Van Kull.

Elizabethport, the eastern part of the city of Elizabeth, is on the western shore of Newark Bay, at its southern end where Arthur Kill enters the bay. The approach to the city wharves is either through the dredged channel in Newark Bay or through Arthur Kill; the former is the shorter, has a depth of about 14 feet, and is good for a draft of 18 feet at high water. There is from 9 to 18 feet water alongside the wharves, according to location. Just to the southward of Elizabethport, crossing Arthur Kill, is the B. & O. R. R. bridge, with a draw 206 feet in the clear on each side of the central pier. Towboats are usually employed by sailing vessels on account of the narrow channel and tidal current. The usual anchorage for vessels waiting for the tide to serve is in the southern part of Newark Bay, to the eastward of Shooters Island.

Pilots for Newark Bay and tributaries can be found on Staten Island when in Kill Van Kull, but they are seldom required, as the masters of many of the towboats are licensed pilots for these waters. (See, also, Pilot Laws for New York Bay, Appendix I.)

Harbor and Quarantine Regulations.—Vessels in these waters are subject to the regulations for New York Bay and Harbor.

Supplies.—Ship chandler's stores, coal for steamers, and water can be had at Newark and Elizabethport.

Repairs.—Repairs to the hulls of vessels and machinery of steamers can be made at Newark and Elizabethport. There is one marine railway at Newark, length about 150 feet. At Elizabethport there is one floating dock and one marine railway, each about 175 feet long.

Ice.—In severe winters Newark Bay and its tributaries are closed to navigation by ice. The large quantities of floating ice in Kill Van Kull, together with the strong tidal currents, make its navigation very hazardous for sailing vessels.

Tides.—The mean rise and fall of tides in Newark Bay is 4·7 feet; high water occurs 1 hour 12 minutes later than at Sandy Hook.

Tidal currents are strong and generally set in the direction of the channel; the exceptions are in the draw of the Central R. R. of New Jersey bridge, where the ebb sets to the southwestward and flood to the northeastward diagonally through the draw; and between Shooters Island and Corner Stake lighted beacon, where the flood sets to the northward and ebb to the southward diagonally across the channel.

*See footnote on page 36.

PASSAIC RIVER

empties into the head of Newark Bay from the northwestward and is the approach by water to the cities of Newark and Passaic, the latter being at the head of navigation, about 11 miles above the mouth of the river. A dike, extending 6,205 feet in a southerly direction into Newark Bay, has been built on the western side of the entrance to the river and a channel 200 feet in width and 10 feet in depth has been dredged to lead from the bay up to the wharves at Newark, but this channel is getting narrower. From Center street bridge, at Newark, to Passaic the channel has been improved, by dredging to a depth of 6 feet and a width of about 100 feet, but this channel has shoaled from 1 to 2 feet in places and is somewhat narrower than when dredged. There are numerous bridges crossing the river; those below Center street bridge having draws about 70 feet in width, and those above, draws not less than about 32 feet in width.

Tides.—The mean rise and fall of tides is 5 feet at Newark, and about 3·3 feet at Passaic.

The city of **Newark** extends along the river for a distance of about 5 miles from its mouth; it has a large water-borne trade; the deepest draft vessels going up to the city being about 13 feet. Sailing vessels usually take a towboat in Kill Van Kull, as the bridges and narrow channel make it almost impossible for any but the smaller vessels to sail up. The depth of water alongside the wharves is 5 to 15 feet, according to location.

The city of **Passaic,** about 8 miles above Newark, has some trade by water. but the draft of vessels going up is limited to about 8 feet. Sailing vessels have to employ towboats on account of the narrowness of the channel, and the bridges which cross the river. The city of **Paterson** is about 2 miles above Passaic, and above the head of navigation.

The **Morris Canal** passes through Paterson and Newark and crosses the Passaic River about ¾ mile above its mouth.

HACKENSACK RIVER

empties into the northeastern corner of Newark Bay and is the approach by water to the town of **Hackensack,** about 13 miles above its mouth. The river is crossed by ten bridges (width of draws 25 to 60 feet) between its mouth and the town. There is a depth in the channel of 10 feet, and the deepest draft taken up at high water is 12 feet; there is 9 feet of water at the wharves.

The mean rise and fall of tides at Hackensack is about 4·5 feet.

Cherry Hill, River Edge, and **New Milford** are three villages, 2, 4, and 5 miles, respectively, above Hackensack.

GENERAL DIRECTIONS, KILL VAN KULL AND NEWARK BAY.

These directions are good for a draft of 23 feet through Kill Van Kull and to the towns on its shores, and for a draft of 13 feet to Elizabethport and Arthur Kill.

From New York Upper Bay.—Coming from The Narrows.—Head for Robbins Reef Lighthouse, and then follow the northeastern shore of Staten Island, giving it a berth of about 300 yards, until between New Brighton and Constable Hook.

Or, coming from the northward, pass about 600 yards to the eastward and southward of Robbins Reef Lighhouse, leaving the bell buoy on the starboard hand. Stand to the southward until Mill Reef beacon (red conical beacon on the north side in the entrance to Kill Van Kull) is in range with the northernmost point of Staten Island at New Brighton; then steer to the westward, giving the shore of Staten Island a berth of 300 yards.

When about midway between the wharves at Constable Hook and the shore of Staten Island follow a mid-channel course until up to Factoryville, where the southern shore should be favored. After passing Factoryville, follow the middle of the channel; pass to the southward of Bergen Point Reef buoy and Bergen Point Lighthouse and anchor with the lighthouse bearing **E.** by **S.**, distant about 400 yards.

If bound to Newark take a pilot or towboat and when passing through the draw of the bridge of the Central R. R. of New Jersey watch the current closely so as not to strike the abutments. The flood sets in a northeasterly and ebb in a southwesterly direction diagonally through the bridge draw.

If bound to Elizabethport a towboat should be taken by sailing vessels. Some local knowledge is necessary to carry the best water. Vessels of 13 feet draft can, when to the southward of Bergen Point Lighthouse, steer **W.** ½ **N.**, so as to leave the wharves on the southern side of Shooters Island (which will be recognized by the large lumber mill on it) about 75 yards on the starboard hand. Corner Stake bacon (lighted) will be opened to the northwestward of Shooters Island; the beacon at high water resembles a black can buoy.

Follow the southern shore of Shooters Island, at a distance of about 75 yards, until Corner Stake beacon bears about **NW.** by **N.**, then steer so as to pass about 50 yards to the eastward of it. Round the beacon at this distance and steer about **W.**, leaving the two red buoys about 30 yards on the starboard hand. When abreast the second red buoy steer about **W.** for the wharves of the city and anchor in midstream.

Remarks and Dangers.—The bridges crossing Newark Bay and Passaic and Hackensack rivers are numerous and require particular attention, for the reason that many of the draws are badly located with regard to the channel and currents.

Shoal water extends about 500 yards to the southward from Robbins Reef Lighthouse, and in rounding the lighthouse it should be given a good berth. The mid-channel course through Kill Van Kull leads in the best water, except at a point nearly 1¼ miles to the eastward of Bergen Point Lighthouse, where there is a 17-foot spot, which can be avoided by keeping in the southern half of the channel.

Bergen Point Lighthouse should be given a berth of 75 to 300 yards, and when standing for the anchorage care should be taken not to stand too far over toward Shooters Island, as the water shoals abruptly from 6 fathoms to 10 feet off the eastern side of the island.

HUDSON RIVER*

takes its rise in one of the lakes in Essex County, in the northeastern part of the State of New York, and flows in a southerly direction for about 260 miles to its junction with East River at the southern end of Manhattan Island, where both enter New York Upper Bay. For a distance of 78½ miles above its mouth (or as far up as Rondout) it has a deep and unobstructed channel navigable for the largest vessels; above Rondout the channel, although it has a depth of 4½ fathoms as far up as Hudson City, is rendered more difficult of navigation by reason of numerous middle grounds and flats, which rise abruptly from deep water and are only partially buoyed. Hudson City is 21½ miles above Rondout and about 30 miles below Troy which is at the head of navigation, about 130 miles above the mouth of the river.

The scenery along this river is very beautiful and in many places grand, and so varied that no detailed description of use to the mariner can be given; many of the more prominent points and objects are mentioned in the sailing directions. There are many manufacturing cities and towns on the river banks, the most important of which are Yonkers, Tarrytown, Sing Sing, Nyack, Newburg, Poughkeepsie, Rondout, Catskill, Hudson City, New Baltimore, Albany, and Troy. There are also numerous small villages and landings along the banks. This river besides furnishing access by water to the cities, towns, villages, and numerous landings, along its banks, is connected, 78½ miles above its mouth, by Rondout Creek, with the **Delaware and Hudson Canal**, and is entered at Albany by the **Erie Canal**, and thus forms a waterway to New York City for the immense traffic of these canals.

Communication with Lake Champlain exists through the **Champlain Canal**, which is only navigable for vessels of 5 feet draft from Albany to Whitehall, a distance of about 63 miles. The locks are 110 feet long and 18 feet wide.

The western bank of the river opposite to New York City is occupied by Jersey City, Hoboken, Weehawken, and Guttenburg. The terminus of the New York, West Shore and Buffalo Railroad is at Weehawken, where there are wharves and slips for loading and discharging large vessels.

Fort Lee is on the west bank of the river 3½ miles above Guttenburg. On the eastern bank, nearly opposite Fort Lee, is **Fort Washington Point** (which is marked by Jeffrys Hook Post-light, see table on page 12), and a little more than 1¼ miles above it is **Tubby Hook**, about ½ mile below the mouth of Spuyten Duyvil Creek. From Fort Lee to Piermont, 12½ miles farther up the river on the same side, the western bank consists of rocky cliffs (in some places thickly wooded with scrub) rising almost vertically to heights varying from 300 to 500 feet and known as The Palisades.

Spuyten Duyvil Creek connects with Harlem River, separating Manhattan Island from the mainland. This creek and Harlem River are being improved, and in 1897 had a channel 12 feet deep at mean low water, with a least width of 150 feet. A number of bridges cross Spuyten Duyvil Creek and Harlem River, two of which are close bridges; High Bridge has a clear width of 55 feet between piers, and the crown of the arch is 100 feet above mean high water. Any vessel able to pass through under High Bridge can pass from the Hudson River to the East River, or vice versa.

Yonkers, on the east bank of the river about 15 miles above its mouth has a number of wharves and considerable trade. Opposite on the west bank are two landings—the lower, Huyler's; the upper, Closter. About 4 miles above Yonkers, on the same side of the river, is Hastings, and about 1 mile farther up is Dobbs Ferry, and opposite it on the western bank is Sneden Landing.

*Shown on three charts: **370**, scale $\frac{1}{60,000}$, price $0.40; **371**, scale $\frac{1}{60,000}$, price $0.20; **372a**, scale $\frac{1}{40,000}$ price $0.20.

Piermont is 21½ miles above the mouth of the river on the west bank. Here is a long coal dock of the New York and Erie Railroad. Irvington is a village opposite to Piermont.

Tarrytown is on the east bank of the river 24 miles above its mouth and about 9 miles above Yonkers. **Kingsland Point,** low, nearly level, and covered with a thick growth of trees, is just above Tarrytown. Off the point is Tarrytown Lighthouse (see table on page 12). Opposite Tarrytown is **Nyack,** which has several wharves. Upper Nyack is about ½ mile above Nyack.

Sing Sing is 28½ miles above the mouth of the river and on its east bank. On the flat shore, at the base of the steep hills on which the town is built, are the buildings and wharves of the New York State Penitentiary, commonly known as Sing Sing Prison. **Sparta** is the southern suburb of Sing Sing, and opposite it on the western bank is **Rockland Lake Landing.** Off the landing is **Rockland Lake Lighthouse** (see table on page 12). Extending about 1¾ miles to the southward of this landing is **Verdrietege Hook,** which is 600 to 730 feet in height and thickly wooded with scrub, but in places shows bare precipitous cliffs when seen from the river. Near the southern part of the Hook it has a height of 730 feet and is called Hook Mountain.

Croton Point is the long peninsula just above Sing Sing; the southern extremity of this point is called **Tellers Point. Croton Bay** is the shallow bight of water to the southeastward and eastward of Croton Point. Croton River, the source of New York City water supply, is the shallow stream emptying into the northern part of the bay.

Tappan Sea is the name given to that stretch of the river, about 2 miles wide, extending from abreast Piermont to Tellers Point, a distance of about 7½ miles.

Haverstraw is on the west bank of the river 32 miles above its mouth, and is remarkable for the number of its brickyards extending along the water front. The river here is 3¼ miles wide, but narrows rapidly to Stony Point, where it is less than 1 mile wide. This wide stretch, extending from Tellers Point to Stony Point, about 5 miles above, is known as **Haverstraw Bay.** About 1¼ miles below Haverstraw is **Waldberg Landing.** The west bank of the river between Rockland Lake Landing and Haverstraw rises precipitously to heights varying from 400 to 800 feet, the highest part, **High Tor,** being about ½ mile to the southward of Haverstraw. **Croton** is on the east bank nearly opposite Haverstraw, and **North Haverstraw** is on the west bank 2 miles farther up the river.

Stony Point (marked by a lighthouse, see table, page 12) is the point on the west bank 3 miles above Haverstraw; opposite to the point is a small bight called **Greens Cove,** and just above this is **Verplanck Point.**

Peekskill is a town on the east bank of the river 38 miles above its mouth; **Red Hook Landing** is its northern suburb. Opposite to Peekskill is **Dunderburg Mountain,** a very high densely wooded hill, terminating to the eastward in a low flat point called **Kidds Humbug.** At the southern base of the hill is a landing and small village known as **Caldwells.**

Just above Peekskill the river becomes much narrower and for a distance of about 8 miles has a width of only about ¼ mile. The river here flows along the base of very high hills (some over 1,000 feet in height) known as **The Highlands.** The beautiful panorama of river scenery between Peekskill and Newburg, about 14½ miles above, is scarcely excelled anywhere in the world. **Anthonys Nose** is the name given to the high, steep, and thickly wooded hill on the eastern bank about 2 miles above Red Hook. About 2 miles above Anthonys Nose and on the west bank is **Con Hook** (marked by a post-light, see table, page 12), and opposite it is **Dennings Landing.**

West Point, 45 miles above the mouth of the river, is the site of the U. S. Military Academy, and can be easily recognized from the prominence of the buildings and the road leading up the hillside from the ferry wharf and station of the West Shore Railroad. Opposite to this station is the village of **Garrison** and a station of the Hudson River Railroad. The northeastern extremity of West Point descends to a rocky point upon the extremity of which is West Point Lighthouse (see table, page 12). On the opposite side of the river and north of West Point is **Constitution Island,** the bend between the two is locally known as **Worlds End** and has very deep water, 36 fathoms being found in the channel. The southwestern end of Constitution Island is known as Magazine Point. A little above Constitution Island, on the west bank of the river, is a steep, rocky, and wooded hill over 1,400 feet in height, known as **The Crows Nest,** and just above it an equally steep and prominent hill, over 1,500 feet in height, known as **Storm King.** About 4 miles above West Point and on the west bank is **Cornwall Landing** and village, just above which is Murderers Creek, and opposite to which is Breakneck Point. **Pallopels Island** is a small island lying near the eastern side of the river 1 mile above Breakneck Point.

Newburgh, a city on the west bank of the river 52 miles above its mouth, has large manufacturing interests and considerable river trade in farm produce. Opposite to the city is **Fishkill** village and landing, 1¼ miles below which is a small shallow creek known as Fishkill Creek. Fishkill is connected by ferry with Newburgh.

From abreast Cornwall to New Hamburg, at the mouth of Wappinger Creek, a distance of 9 miles, the

river has an average width of about 1 mile and a broad channel with depths of from 5 to 20 fathoms, the latter depth being found off **New Hamburg**, 58 miles above the mouth of the river. Opposite to New Hamburg, on the west bank, is the village of **Hampton**, about 1 mile below which is Danskammer Point, low and rocky and marked by a lighthouse (see table, page 12).

Poughkeepsie, about 7 miles above New Hamburg and 65 miles above the mouth of the river, has about 1 mile of wharf front and is the center of a very important trade in manufactured goods. At Poughkeepsie the river is crossed by a bridge with spans over 500 feet in length and 160 feet above the level of mean low water. Opposite to Poughkeepsie are the villages of **Louisburg** and **New Paltz** (sometimes called Highlands).

From Poughkeepsie to **Rondout**, 13½ miles farther up, the river has a deep and unobstructed channel and on its banks between these two places are a number of villages and landings, but they are of no importance.

Esopus Island, small and narrow, with a post-light upon it (see table, page 12), is 72 miles above the mouth of the river and 7 miles above Poughkeepsie. **Esopus** is a town on the west bank of the river abreast Esopus Island. About 2½ miles above Esopus Island, on the west bank, is Esopus Point on the eastern extremity of which is Esopus Meadows Lighthouse (see table, page 12).

Rondout Creek enters the western side of Hudson River 78½ miles above its mouth. The entrance, through which 14 feet can be carried, is between two long dikes, the northern one of which has a spur extending northward to Kingston Point. The creek is a tidal stream and is important as furnishing access to the entrance to the **Delaware and Hudson Canal**, which enters the creek at Eddyville, about 2½ miles above its mouth. The town of Rondout and villages of Sleightburg and Wilbur are built upon the bank of the creek. Rondout, on the north bank of the creek, has considerable trade, principally in slate, brick, and cement. About 14 feet can be taken up to Rondout, 8 feet to South Rondout, and 6 feet to Eddyville. There is a very large water-borne trade through the creek, due mainly to the fact that it forms the access to the canal. **Rhinebeck** is on the east bank of the river opposite to the mouth of Rondout Creek.

From Rondout to the head of navigation the width of the river is very varied and there are many extensive shoals, but the channel is fairly well marked as far as **Hudson City**, 100 miles above the mouth of the river.

Barrytown is a village on the east bank of the river, 5 miles above the mouth of Rondout Creek; and 2½ miles farther up is **Glasco**, on the west bank. This village is reached by a narrow channel, with a least depth of 3¼ fathoms, which leads close along the west bank of the river and to the westward of the extensive shoal known as Saddle Bags, which extends out beyond the middle of the river. On both banks of the river, between Rondout Creek entrance and Glasco, there are a number of landings where slate, brick, cement, ice, etc., are loaded.

Magdalen Island is a small island lying in the eastern part of the river nearly abreast Glasco. Nearly 1 mile above the island, on the east bank, is the village of **Tivoli**.

Esopus Creek enters the western side of the Hudson River 88 miles above its mouth. The town of **Saugerties** is on the north bank of the creek about ¾ mile from its mouth. The creek just inside its mouth is known as Saugerties Harbor. The channel into the harbor has been improved by dredging and building of two long dikes, one on its north and the other on its south side, so that now a draft of 7 feet can be taken in at ordinary low water. A lighthouse and post-light (see table, page 12) mark the entrance and south dike at Esopus Creek. Green Flats Post-light is on the western edge of Green Flats and about 1 mile above Esopus Creek entrance.

Malden is a village on the west bank about 1¼ miles above the mouth of Esopus Creek; about 1 and 2 miles, respectively, above Malden are the villages of Evesport and West Camp. Nearly opposite to West Camp is East Camp, and about ½ mile above it is **Germantown**, which is 92 miles above the mouth of the river. On a shoal near the center of the river a little above Germantown is Upper Coal Beds Post-light (see table, page 12). Nearly 2¾ miles above this light at the mouth of Livingston Creek, on the east side of the river, is Livingston Creek Post-light.

Catskill is 97 miles above the mouth of the river on the west bank just above the mouth of Catskill Creek. A long dock extends to the eastward from the west bank to a small island (covered with ice houses) lying near the edge of the deep-water channel of the Hudson River. On the west side of the channel, about 400 yards above the end of the dock, is Catskill (West Flats) Post-light. Oakhill Depot (Catskill Station) is on the east bank of the river opposite to the mouth of Catskill Creek. About ½ mile below **Oakhill Depot** is the railroad dock and just below it is Livingston dock.

From Catskill to Brandon Point, a distance of about 2½ miles, the channel is narrow, but has a depth of 5 to 9 fathoms, and the stretch is known as Percy Reach. Near the upper end, and on the northwest side of the reach, is Percy Reach Post-light (see table, page 14). To the eastward of this reach, and separated from the mainland to the eastward by Hallenbeck's Creek, is Rodgers Island. This island, low and thickly wooded,

is 1 mile long and about ¼ mile wide, and is surrounded by mud flats covered with grass. There is a small marshy island about 250 yards to the southwestward of Rogers Island.

Hudson City is on the east bank of the river 100 miles above its mouth. Nearly opposite to Hudson City is the village of Athens.

Above Hudson City the channel of the river is narrow and intricate, and although its navigation has been much facilitated by diking, dredging, and the establishment of aids to navigation, strangers should always take a pilot. There is a depth in the channel, at ordinary low water, up to Albany of about 10½ feet and 9 feet to Troy, the head of navigation.

Albany is on the west bank of the river, about 24 miles above Hudson City and 124 miles above the mouth of the river. **Greenbush** is opposite Albany, and **Troy** 6 miles above, on the east bank of the river. Opposite to Troy is **West Troy**, extending to the mouth and some distance along the western bank of the Mohawk River. Watervliet, a suburb of West Troy, is the site of the U. S. Arsenal.

Tides.—For tidal data at Governors Island, see table, page 21. High water, at the points named along the Hudson, occurs later than at Governors Island; the difference in the times and mean rise and fall of tides is as follows: At Sing Sing, 1h. 49m., 3·3 feet; West Point, 2h. 50m., 3·3 feet; Poughkeepsie, 3h. 54m., 3·2 feet; Barrytown, 5h. 7m., 3·3 feet; Stuyvesant, 7h. 33m., 3 feet; Albany, 9h. 33m., 2·3 feet.

GENERAL DIRECTIONS, HUDSON RIVER.

The following directions will carry a depth of 4 fathoms as far as Rondout, 78½ miles above the mouth of the river, and a depth of 17 feet as far as Hudson City, 100 miles above the mouth. The depth in the channel is greater than the depths for which the directions are given, but local knowledge is necessary to carry the best water.

In entering the river keep well over toward the eastern bank and steer **N.** by **E.** ¼ **E.**, favoring that bank and giving the ends of the piers a berth of 250 to 500 yards. When abreast pier No. 55, at the foot of Twenty-fifth street, change the course to **NE.** ¾ **N.** This course will lead along the eastern bank, in 5½ to 9 fathoms of water, until abreast the foot of One hundred and fifty-fifth street on the east and the wharf at Fort Lee on the west bank, when the course must be changed to the northward (about **N.** by **E.** ¾ **E.**) so as to leave Fort Washington Point 200 to 300 yards on the starboard hand.

From abreast the post-light at Fort Washington Point, steer about **NNE.** ¾ **E.** for about 4 miles (keeping the eastern bank well aboard), until abreast Mount St. Vincent Roman Catholic Seminary (about 1 mile below Yonkers), which is easily recognized by the large red brick building with white granite chapel in front of it. From here continue to follow along the eastern bank (course about **N.** by **E.** ⅞ **E.**). The wharves at Yonkers, Hastings, Dobbs Ferry, and Irvington (3, 4½, and 6 miles, respectively, above Yonkers) should be left about 500 yards on the starboard hand.

A number of landings will be seen along the western bank, and opposite to Irvington is the long wharf of the New York and Erie Railroad. The houses of Tarrytown will be seen about 2½ miles above Irvington, and on the western bank those of the villages of Nyack and Upper Nyack, and a little to the northward of the latter the high land of Verdrietege Hook.

Abreast Irvington that wide stretch of the river known as Tappan Sea (see description) is entered. From Sneden Landing (opposite to Dobbs Ferry) to Rockland Lake Landing, a distance of about 8 miles, extensive shoals make out from the western shore for distances of ½ to 1½ miles; shoals also make out from the eastern shore, but for a much less distance. The channel follows the eastern bank until nearly up to Sing Sing, when it bends to the westward and follows the western bank through Haverstraw Bay. (*See Supplement, Art. 16.*)

When about ½ mile above the landing at Irvington, and about 700 yards distant from the eastern shore, steer **N.** ⅛ **E.** so as to pass ½ mile to the westward of Tarrytown Lighthouse, and when it bears **E.**, steer **N.** by **E.** ⅛ **E.** for 2¼ miles, running parallel to the east bank of the river and a little over ½ mile from it; then steer **N.** by **W.** ¼ **W.** with Rockland Lake Lighthouse on the port bow, and keeping Teller's Point (low and wooded to its western end) on the starboard bow; continue this course about 1¾ miles until Rockland Lake Lighthouse is ⅜ mile distant on the port beam, and then steer **NNW.** ½ **W.** The brickyard docks at Haverstraw will be ahead; follow the line of the docks, giving them a berth of about 700 yards, and when Stony Point Lighthouse, which is on the top of a hill to the northward of

Haverstraw, is made, steer so as to pass ¼ mile to the eastward of the point. The eastern side of Haverstraw Bay is full of shoals; the channel here has a general width of about ⅝ mile.

From Stony Point to West Point, a distance of about 10½ miles, the channel is deep and the banks generally bold-to, except in the bight at Peekskill, and it is only necessary to keep near the middle of the river and out of the bights and shallow coves. When a little over 2 miles above Stony Point haul over toward the west bank and follow it a distance of about 400 yards; the stretch of the river above, which has a **NW.** direction, will not be opened until nearly up to the Dunderberg.

Con Hook is a small wooded point on the west bank of the river 2¾ miles below West Point; when seen from the southward the low land, which is just to the westward of the hook, makes the latter appear somewhat like an island. About ⅜ mile to the southward of Con Hook there is a small shoal spot with only 9 feet over it, but it is marked by a black buoy and is easily avoided.

From West Point to New Hamburg, nearly 13 miles farther up the river, keep near the middle of the river, favoring the west bank. On the port hand will be passed the following landings, in the order named: Cornwall, New Windsor, Newburgh, and Armstrong; and on the starboard hand, Cold Spring, Fishkill, and Carthage. Pallopels Island, 4 miles above West Point, will be left well on the starboard hand. Between Pallopels Island and Carthage, 6 miles above, shoals make out 400 to 900 yards from the east bank; the western edge of these shoals rises abruptly from deep water and extends nearly parallel to the west bank; the east bank is irregular and is broken, about 2 miles above Pallopels Island, by Fishkill Creek entrance. The long wharf at Fishkill Landing, opposite to Newburg, extends to the western edge of the shoal water.

Danskammer Point, on the west bank, is low at its end and covered with trees; the clay pits at Armstrong, about ½ mile below the point, are a conspicuous feature. When past the lighthouse (see table, page 12) on Danskammer Point, Poughkeepsie bridge, on a clear day, will be seen. A sharp lookout should be kept for the buoy (red and black horizontal stripes) marking Diamond Reef, a small shoal spot near the middle of the river, just above the mouth of Wappinger Creek. New Hamburg is on the north side of the creek.

From New Hamburg to Poughkeepsie, about 7 miles farther up the river, it is only necessary to keep near the middle of the river, the course being about **N.** by **E.** ⅛ **E.** The least depth found will be about 5 fathoms and the average about 8 fathoms, but deep holes of 15 and 17 fathoms will be found about 2 miles below Poughkeepsie, abreast Blue Point.

Passing under the Poughkeepsie bridge continue the **N.** by **E.** ⅛ **E.** course for about 2¾ miles, then change the course to about **N.** by **W.** ½ **W.,** continuing to keep in the middle of the river. Esopus Island will soon be seen to the northward and may be steered for; course about **N.** by **E.** When up to this island pass on either side of it and follow the eastern bank, giving it a berth of not over 500 yards, until abreast Lewis Pier (on east bank about 1⅝ miles above the north end of Esopus Island) and Esopus Meadows Lighthouse bears **N.** ½ **E.** Pass 200 to 500 yards to the eastward of the lighthouse and haul gradually to the westward and favor the west bank. Rondout Lighthouse and the post-lights at the entrance to Rondout Creek will be seen to the northward, and when the lighthouse bears **N.** ½ **W.** it may be steered for. When abreast Port Ewen, about ¾ mile below Rondout Creek entrance, haul over toward the eastern bank and pass about midway between it and the outer ends of the dikes at Rondout Creek entrance. A shoal about 1¼ miles long lies along the eastern bank of the river, about 1 mile above Esopus Meadows Lighthouse; on the western side, near the southern and northern ends, the shoal is marked by red buoys No. 8 and 10, respectively. There is a narrow channel, with about 3½ fathoms of water, between the shoal and the eastern bank of the river, by which vessels reach the landing at Ellerslie.

From Rondout to Hudson City the distance is about 21½ miles, and there are numerous extensive shoals and flats, but with local knowledge a depth of 4 fathoms can be carried. The following directions are safe for vessels of 15 feet draft:

About 1 mile above the entrance to Rondout Creek a shoal, called The Flats, begins and extends along the middle of the river for a distance of about 4 miles, nearly up to Barrytown. This shoal has a least depth of about 2 feet on it and an average depth of about 4 feet, and is only about ¼ mile wide at its widest part. It is marked at each end by buoys

(red and black horizontal stripes) and there is a deep channel on either side of it, but the eastern channel is the wider.

From abreast Rondout Creek entrance steer **N.** by **E.** $\frac{1}{8}$ **E.** This course leads close along the eastern bank of the river and, made good for $4\frac{3}{4}$ miles, leads up to abreast Goose Island, a small island lying near the eastern bank just above Pic Nic Point and about $\frac{3}{8}$ mile below the wharves at Barrytown. The **N.** by **E.** $\frac{1}{8}$ **E.** course continued leads up to the wharves at Barrytown.

To proceed up the river when abreast Goose Island, change the course to about **N.** by **W.** and stand over toward the western bank, and pass between the buoy on the northern end of The Flats and the buoy on the southern end of Hogs Back, and when the latter buoy bears **E.** steer **N.** by **E.** $\frac{1}{2}$ **E.**

Hogs Back is a shoal about 1 mile long lying in the middle of the river just above Barrytown; there is a deep channel on either side of it, but the eastern one is very narrow. The **N.** by **E.** $\frac{1}{2}$ **E.** course draws gradually over toward the east bank. A broad shallow bight on the eastern side of the river, known as South Bay, will be seen on the starboard hand, and Magdalen Island will be a little on the starboard bow. Keep a sharp lookout for black buoy No. 3, and leave it about 200 yards on the port hand. This buoy is on the eastern edge of the extensive shoal known as Saddle Bags, lying in the western part of the river abreast and below Glasco.

Continuing the **N.** by **E.** $\frac{1}{2}$ **E.** course, leave Magdalen Island 200 yards on the starboard hand and the wharves at Tivoli about the same distance on the same hand, and when abreast the upper wharf haul to about **N.** $\frac{3}{8}$ **E.** and leave black buoy No. 5 and Saugerties Lighthouse about 150 yards on the port hand. From abreast this lighthouse steer about **N.** $\frac{3}{8}$ **E.** for the outer ends of the wharves at Malden, which will be seen about $1\frac{1}{2}$ miles farther up on the west bank. Leave Green Flats Post-light, on the western edge of Green Flats, about 150 yards on the starboard hand. Green Flats, nearly all bare at ordinary low water, are about $1\frac{1}{2}$ miles long and lie in the eastern part of the river abreast Malden. These flats are separated from the eastern bank by a deep and narrow channel, and also from Upper Flats by a narrow channel, with a depth of $3\frac{1}{4}$ fathoms, called The Maelstrom. Upper Flats extend about $1\frac{1}{2}$ miles to the northward and join the shoals which extend out to the middle of the river from the eastern bank abreast East Camp and Germantown.

From abreast the wharves at Malden keep well over toward the western bank, steering about **NNE.** $\frac{1}{2}$ **E.** past Evesport and West Camp. Leave red buoy No. 12 about 200 yards on the starboard hand, and then steer **NE.** so as to pass about 250 yards to the eastward of Upper Coal Beds Post-light (see table, page 12). A shoal extends about 1 mile to the northward from this light, and the channel to the eastward of it is only about 300 yards wide. There is a broad marshy bight on the western side of the river about the post-light, and a long narrow shoal extending from a point about $\frac{1}{2}$ mile to the northward of it, up to abreast Livingston Creek Post-light (see "Table of Lights," page 12).

From a position about 250 yards to the eastward of Upper Coal Beds Post-light steer **NE.** $\frac{1}{8}$ **N.** 1 mile, until abreast Smiths Dock (the first dock on the east bank), when change the course to **NE.** so as to pass about 200 yards to the westward of Livingston Creek Post-light. Continue on the **NE.** course for about $\frac{1}{8}$ mile beyond the post-light, and then haul up to about **NNE.** and leave Livingston Dock and the railroad dock about 150 yards on the starboard hand.

When abreast the mouth of Catskill Creek, and Catskill Post-light shows open to the eastward of the ice houses on the long dock at Catskill, steer about **N.** $\frac{1}{2}$ **W.** leaving red buoy No. 14 about 150 yards on the starboard hand and the post-light about the same distance on the port hand. Pass about midway between the west bank and the small island to the southward of Rodgers Island, and then follow the western bank, giving it berth of at least 150 yards. Keep a sharp look out for red buoy No. 16 (on the edge of the shoal on the western side of Rodgers Island), and when about 150 yards to the westward of it, steer for Percy Reach Post-light, course about **NE.** As this post-light is approached haul gradually to the eastward so as to pass about 300 yards to the southeastward of it on a **ENE.** $\frac{1}{4}$ **E.** course, and continue this course up to Hudson City, leaving Hudson City Lighthouse on the port hand.

To navigate the river above Hudson City local knowledge or a pilot is necessary.

COAST FROM SANDY HOOK TO CAPE MAY.*

The distance from Sandy Hook to Cape May is about 110 miles. The characteristic features of this coast are its sand beaches, numerous summer resorts, and life-saving stations, the latter being placed at an average distance of less than 3 miles apart along this coast. The lighthouses along the coast (see table, page 14) are the principal aids to navigation and are the objects most easily recognized. To the westward of the beaches and extending from Bay Head (a village 18½ miles to the northward of Barnegat Inlet) to Cape May are large shallow bays with numerous small rivers and creeks; the bays are connected by shallow creeks and estuaries permitting boats to pass from one to the other. These inland waters are entered from seaward by a number of inlets, which have shifting bars and shoals at their eastern entrances, over which narrow and generally crooked channels, in some cases marked by buoys, lead to good anchorages inside.

The depth of water in the channels across the bars of the inlets ranges from 3½ feet on some to 9 feet on the most important; but these depths are subject to changes during severe storms, which will sometimes close the old channel and open a new one.

The navigation of the inlets and bays is confined to vessels of light draft; a few small steamers ply between the towns and villages on the shores of the bays and rivers. Railroad bridges cross these waters at several places.

From Sandy Hook to Barnegat Inlet, a distance of 43 miles, the coast has a general **S.** by **W.** ½ **W.** trend; 2 miles offshore, between these points, the depths range from 6½ to 11 fathoms, and from Long Branch to a point 4½ miles **N.** of Barnegat Lighthouse the least water to be found ¾ mile from the beach is 6 fathoms.

Seabright, Low Moor, Monmouth Beach, and Long Branch are from 2 to 5½ miles to the southward of Navesink Lighthouses. Long Branch being the most conspicuous on account of its greater number of large hotels. To the southward of Long Branch are West End, Elberon, Deal, and Asbury Park, the latter being 10½ miles to the southward of the Highlands of Navesink and 7 miles to the northward of Manasquan (Squan) Inlet.

To the southward of Asbury Park are Ocean Grove, Ocean Park, Neptune City, Key East, Ocean Beach Lake Como, Spring Lake, and Seagirt, where there is a lighthouse (see table, page 14), the latter being 22¾ miles to the northward of Barnegat Lighthouse and 1¾ miles to the northward of **Manasquan Inlet.** This inlet is the entrance to **Manasquan River,** a shallow stream, navigable only for small craft; the depth of water over the bar at the entrance to the inlet is about 3½ feet at low water, but it is liable to be changed at any time by a gale.

About 1 mile to the southward of Manasquan Inlet is Point Pleasant, and 1 mile farther down the beach is Bay Head. About 6 miles below Bay Head is Lavalette City, and the next summer resort to the southward is Seaside Park, which is about 9 miles to the northward of Barnegat Lighthouse.

From Barnegat Inlet to Absecon Inlet, a distance of 29 miles, the coast has a general **SW.** ¾ **S.** trend, and is broken by Little Egg Inlet (shown on charts as New Inlet), marked on its northern side by Tucker Beach Lighthouse, and Brigantine Inlet, 4¼ miles to the southward. Along the coast between Barnegat and Tucker Beach lighthouses there are several spots with 19 to 26 feet of water over them lying as far as 2 miles offshore, and between Tucker Beach Lighthouse and Absecon Inlet spots with 25 feet of water over them will be found nearly 5 miles offshore. About 4 miles to the northward of Tucker Beach Lighthouse is Beach Haven, a summer resort.

From Absecon Inlet to Hereford Inlet, a distance of 28 miles, the trend of the coast is about **SW.** ½ **S.** Shoal spots, with 16 to 24 feet, lie nearly 5 miles from the beach to the southeastward of Ludlam Beach Lighthouse. Between Absecon Inlet and Hereford Inlet the coast line is broken by three inlets—Great Egg, Corson, and Townsend. Ludlam Beach Lighthouse is about midway between Corson and Townsend inlets.

South Atlantic City is a summer resort about 4 miles to the southward of Atlantic City, and Longport is a small resort a short distance to the northward of the entrance to Great Egg Inlet (shown on charts as Egg Harbor Inlet). *To the southward of Hereford Inlet* the coast takes a gradual curve to the southwestward and westward for a distance of 10 miles to Cape May Point, and is broken by two unimportant inlets, Turtle Gut Inlet and Cold Spring Inlet. To the eastward of this stretch, at distances ranging from 6 to 14 miles from the beach, is Five Fathom Bank. Delaware Bay entrance and the extensive shoals making off to the southward and lying to the southeastward of Cape May are described in connection with the sailing directions for Delaware Bay and River.

Cape May City is the large summer resort about 2 miles to the eastward of Cape May Lighthouse. Its numerous large hotels and long iron pier form conspicuous landmarks for vessels passing alongshore. **Cape**

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*Shown on chart **8**, scale $\frac{1}{400,000}$, price $0.50; and in parts on **121, 122, 123**, scale of each $\frac{1}{80,000}$, price of each $0.50.

May Point is a summer resort on the southwestern point of Cape May about 2 miles to the westward of Cape May City. On the western shore of Cape May, at Cape May Point, a pier is erected in the spring and used as a landing for steamers; off its end there is usually about 12 feet of water. To prevent its loss from ice the pier is removed in the fall.

See also the "General Remarks on approaching or standing along the Coast from Sandy Hook to Cape May" following; also the "Remarks" on pages 29-31.

BARNEGAT INLET*

is marked by Barnegat Lighthouse on the southern side of its entrance, which is 43 miles to the southward of Sandy Hook and 18 miles to the northward of Tucker Beach Lighthouse. Shoals make off to seaward nearly 1¼ miles from the entrance; these shift with every heavy gale and alter the depth of water on the bar, which is usually 4½ to 5 feet at low water; a narrow and crooked channel, marked by buoys, leads in to Barnegat Bay and its tributaries. No directions can be given for entering except to follow the buoys, which are moved from time to time so as to indicate the best water. Strangers should always take a pilot, lying-to off the entrance with signal flying until boarded by one from **Barnegat City**, the village near the lighthouse. The deepest draft taken over the bar is 7 feet at high water with a smooth sea. Good anchorage is found in the channel to the westward of the lighthouse.

Barnegat Bay is a large shallow body of water extending 18½ miles to the northward, on the western side of Island Beach to **Bay Head**, and about 3 miles to the southward to the village of **Barnegat**; here it connects with the shallow estuaries extending back of Long Beach about 15 miles, to Little Egg Inlet (New Inlet). In the bay are numerous islands and flats, and a large number of creeks and small rivers empty into it from the westward. The principal villages on the bay and its tributaries and their distance from Barnegat Lighthouse are as follows: Watertown, 4 miles; Barnegat, 5 miles; Forked River, 6½ miles; Cedar Creek, 8½ miles; **Toms River**, 15 miles; Bay Head, 18½ miles. The draft taken to the several villages is 4 feet to Bay Head, about 5 feet to Toms River, and 7 feet to Barnegat. A railroad drawbridge crosses the bay about 9½ miles to the northward of Barnegat Lighthouse; the width of the draw is about 60 feet. **Ice** usually closes the bay to navigation in the winter. It is high water in Barnegat Inlet 15 minutes later than at Sandy Hook, and the mean rise and fall of tides is 2·2 feet (see table, page 21).

LITTLE EGG INLET, LITTLE EGG HARBOR, AND GREAT BAY.*

Little Egg Inlet (New Inlet) is 19 miles to the southward of Barnegat Inlet and 10 miles to the northward of Absecon Inlet; it is the entrance from seaward to Little Egg Harbor and Great Bay and the adjacent inland waters. The northern side of the entrance is marked by Tucker Beach Lighthouse. Shifting sand shoals extend from ¾ mile to 1¾ miles to the eastward from the entrance, and through them are two narrow channels, marked by buoys, leading into Little Egg Harbor and Great Bay. **Tucker Cove Inlet**, the northern of the buoyed channels, usually has a depth of 7 to 9 feet at low water, and **Little Egg Harbor Inlet**, the southern channel, has a depth of 4 to 7 feet at low water. As these depths change with every heavy gale it is impossible to give more definite information. Tucker Cove Inlet is the one most frequently used; the deepest draft taken in through this channel is 11 feet at high water with a smooth sea.

The usual and best anchorages are in the channel to Little Egg Harbor and in Shooting (West) Thorofare. The buoys in the channels are shifted as found necessary to indicate the best water, and no directions can be given that would be of practical use to a stranger trying to enter, except to follow the buoys, or, better still, take a pilot. In winter ice usually prevents vessels from entering.

Little Egg Harbor is a large shallow body of water to the northwestward of Tucker Beach Lighthouse. It is entered from Little Egg Inlet by a number of narrow and crooked channels leading between islands and flats which lie in the southeastern part of the harbor. Only small craft frequent the harbor and adjacent waters. **Tuckerton**, a village about 7 miles from the lighthouse, is the most important settlement; 6 feet can be taken there at high water. **West Creek** is a village 2 miles to the northward of Tuckerton; and **Manahawken** is a village about 11 miles to the northward of Tucker Beach Lighthouse.

Great Bay is a shallow body of water about 3½ miles in diameter lying directly west from Little Egg Inlet. The bay is navigable for small craft only, and has a depth of 4 feet; **Mullica River** empties into its western end. This river is navigable for vessels of 4 feet draft about 20 miles, to the village of Pleasant Mills.

It is high water in Little Egg Inlet 14 minutes later than at Sandy Hook, and the mean rise and fall of tides is 3½ feet. For tidal data of Great Bay see table on page 21.

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*Shown on chart **122**, scale $\frac{1}{80{,}000}$, price $0.50.

BRIGANTINE INLET*

is a narrow opening in Brigantine Beach, about 4¼ miles to the southward of Tucker Beach Lighthouse, forming a connection with the shallow bays and thorofares extending west of the beach between Little Egg Inlet and Absecon Inlet. Shoals extend nearly 1½ miles to the eastward of the entrance, forming a bar over which there is a depth of about 3 feet at low water, but this depth is subject to change by heavy gales. Only small vessels piloted by those with local knowledge enter the inlet; the channel is not buoyed, and directions of practical value can not be given. **Brigantine** is a summer resort about 3 miles south of the inlet and about the same distance to the northward of Absecon Lighthouse. Brigantine Shoal, having spots with 6 to 11 feet over them, extends a little over 2½ miles to the eastward from the beach at the summer resort, and is marked at its eastern end by a black buoy; about 1¾ miles to the southeastward of this buoy is a whistling buoy. Deep-draft vessels should give the shore between Little Egg Inlet and Absecon Inlet a berth of about 5 miles.

ABSECON INLET*

is marked on the southern side of its entrance by Absecon Lighthouse and **Atlantic City,** the latter one of the largest popular summer resorts on the Atlantic coast. The inlet is 10 miles south of Tucker Beach Lighthouse and about 18 miles to the northward of Ludlam Beach Lighthouse. Off the entrance is a shifting sand bar and detached shoal, the latter nearly 2½ miles from the beach. To the southeastward of the lighthouse and leading across the bar is a narrow buoyed channel with a depth of 5 feet, but this depth is liable to change with easterly gales, and the channel may change to another place over the bar. The buoys are generally placed to indicate the best water.

The deepest draft taken in over the bar is 8 feet at high water with a smooth sea; there is 15 feet of water at the railroad wharf in Atlantic City. Strangers entering should take a pilot, lying off the sea buoy to the southeastward of the lighthouse until one comes off from shore; the piloting is done by regular pilots. When inside the inlet, the best anchorage is found in the channel about ¾ mile to the northward of the lighthouse.

A limited supply of coal can be had alongside the railroad wharf and provisions can be obtained in Atlantic City. **Wind Signals** of the U. S. Weather Bureau are displayed from a building in Atlantic City so as to be visible to vessels passing alongshore.

Directions of practical value for entering the inlet can not be given; the buoys are the only guides for a stranger and they can not always be relied on to indicate the best water. It is high water at Atlantic City 19 minutes later than at Sandy Hook, and the mean rise and fall of tides is 4·2 feet (see table, page 21).

GREAT EGG INLET AND GREAT EGG BAY.†

Great Egg Inlet (Egg Harbor Inlet) is the approach from seaward to Great Egg Bay, Great Egg River, Pecks Bay, and Tuckahoe River. The entrance to the inlet, lying 7¾ miles to the southwestward of Absecon Lighthouse, and about 10 miles to the northward of Ludlam Beach Lighthouse, has shifting shoals extending about 1½ miles to seaward, through which a narrow buoyed channel, with a depth of 6 to 8 feet at low water, leads into Great Egg Bay. The deepest draft that has been taken in over the bar is about 11 feet at high water, but owing to the changes continually taking place in the depths a stranger should not rely upon finding more than 6 feet at low water. The buoys are shifted when practicable to indicate the best water, and with a fair wind and smooth sea there is little difficulty in standing in to the anchorage, but a stranger bound up any of the tributaries of Great Egg Bay should take a pilot.

In winter ice closes the bay to navigation and the drift ice running out over the bar makes any attempt to enter extremely hazardous. The currents follow the general direction of the channel and in the inlet have a velocity of nearly 2 knots an hour; inside the entrance their velocity is not so great.

Ocean City, a summer resort on the south point at the entrance to the inlet, has steamboat communication with Longport and Somers Point, and a branch railroad connecting with the West Jersey Railroad at Sea Isle City.

Great Egg Bay (Great Egg Harbor Bay) extends to the westward from Great Egg Inlet for a distance of 4 miles; it has a number of low marsh islands stretching across its eastern end, between which are the several channels leading to the head of the bay and into Great Egg and Tuckahoe rivers. A number of "thorofares" and bays lead to the northward to Absecon Inlet, and to the southward Pecks Bay and a number of "thorofares" lead to Corson Inlet.

Somers Point is a village on the northern shore of the bay; it is the terminus of a railroad and has steamboat communication with Longport and Ocean City; there is 9 feet of water alongside the wharf. Longport has railroad communication with Atlantic City. Bushleys Point is a small village on the south shore of the bay.

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*Shown on chart **122**, scale $\frac{1}{80,000}$, price $0.50.

†Shown on chart **123**, scale $\frac{1}{80,000}$, price $0.50.

Great Egg River (Great Egg Harbor River) has a narrow and crooked channel, and is navigable for vessels up to 7 feet draft to **Mays Landing**, a village about 12 miles above its mouth. **Tuckahoe River** has a crooked channel navigable for vessels of 8 feet draft as far as Marshallville, about 9 miles above its mouth.

Sailing directions of value can not be given. Those not familiar with the locality should take a pilot outside the bar, lying off and on until boarded by one. It is high water in Great Egg Inlet 15 minutes later than at Sandy Hook, and the mean rise and fall of tides is 4·3 feet.

CORSON INLET *

is about 6 miles to the southward of Ocean City, and about 3¼ miles to the northward of Ludlam Beach Lighthouse; it has a shifting bar at the entrance through which there is a channel with a depth of 5 to 7 feet at low water. The inlet is of no commercial importance and the channels are not buoyed. **Sea Isle City** is a summer resort about 3½ miles to the southward of Corson Inlet. Ludlam Beach Lighthouse is located in the northern part of the town.

TOWNSEND INLET *

is about 3 miles to the southward of Ludlam Beach Lighthouse and 7¾ miles to the northward of Hereford Inlet Lighthouse; it has a shifting bar which extends about 1 mile to the eastward from the entrance, and has about 3 feet of water on it at low water. Only small craft pass through the inlet and then with a smooth sea; the channel is buoyed, but strangers should not attempt to enter without a pilot.

HEREFORD INLET *

is marked at the southern point of the entrance by Hereford Inlet Lighthouse, and **Anglesea**, a summer resort. The entrance is 10½ miles to the southward of Ludlam Beach Lighthouse and 9½ miles to the northeastward of Cape May Lighthouse; it has a shifting bar extending 1¼ miles offshore, through which a narrow buoyed channel, with a depth of about 6 feet at low water, leads into an anchorage behind Tathams or Seven Mile Beach.

Strangers seldom enter; a few vessels engaged in the oyster trade and owned in the vicinity use the inlet as an anchorage. No directions for entering can be given, except to follow the buoys, which are shifted, when the channel changes, to indicate the best water. About 1 mile outside of the bar and 2½ miles **E.** by **N.** from Hereford Inlet Lighthouse is a black bell buoy, outside of which vessels bound along the coast should pass.

Jenkins Sound, a shallow body of water to the northwestward of the inlet, is entered through several narrow and crooked "thorofares." **Mayville**, a village on the western shore, can be reached at low water by vessels of 6 feet draft. **Holly Beach** is a summer resort about 1½ miles to the southward of Anglesea, with which it has railroad communication. It is high water in Hereford Inlet 7 minutes later than at Sandy Hook, and the mean rise and fall of tides is 4·3 feet.

TURTLE GUT INLET *

is about 4 miles to the southwestward of Hereford Inlet Lighthouse; it has a shifting bar, over which there is a channel with a depth of about 3½ feet at low water. The channel is not buoyed and strangers should not attempt to enter. Small vessels drawing as much as 6 feet, engaged in the oyster trade, enter the inlet at high water and with a smooth sea. The shoals at the entrance extend about ¾ mile from the beach.

COLD SPRING INLET *

is about 5¼ miles to the southwestward of Hereford Inlet Lighthouse and about 4¼ miles to the eastward of Cape May Lighthouse; its entrance, obstructed by a shifting sand bar, has a depth of about 4½ feet in the channel, which is not buoyed and changes frequently; southeast gales make the most marked changes in the depth and direction of the channel. Strangers should not attempt to enter without a pilot. High water occurs 9 minutes later than at Sandy Hook; mean rise and fall of tides is 4·4 feet.

GENERAL REMARKS ON APPROACHING OR STANDING ALONG THE COAST, FROM SANDY HOOK TO CAPE MAY.

In clear weather vessels of the deepest draft (24 feet and over) should give the shore between Sandy Hook and Little Egg Inlet (Tucker Beach Lighthouse) a berth of at least 3 miles to insure a greater depth than 7 fathoms; but between Tucker Beach Lighthouse and Absecon Inlet a berth of at least 5 miles should be given the shore to clear the 4 and 5 fathom spots lying to the eastward of Brigantine Beach. Southward from Absecon Inlet to Delaware Bay Entrance, detached shoals, with depths of less than 6 fathoms over them, will be found

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* Shown on charts **123, 124**, scale $\frac{1}{80,000}$, price of each $0.50.

scattered along and at various distances from the shore. Five Fathom Bank (see description) is the farthest offshore, its southern end lying about 16 miles in an **ESE.** direction from Cape May Lighthouse; vessels of a greater draft than 18 feet should pass to the eastward of this shoal.

In thick or foggy weather consult the remarks on pages 29–31, under the heading "General remarks on the approaches to New York Bay and Harbor from Sea."

Coasters, or vessels of less than 18 feet draft, in clear weather and with strong westerly winds, may follow the coast, giving the shore a berth of a little more than 1 mile between Long Branch and Tucker Beach Lighthouse, then hauling offshore so as to give the shore a berth of a little over 2 miles, passing outside of Brigantine Shoal and inside the shoal off Ludlam Beach Lighthouse and to the westward of Five Fathom Bank. In strong easterly winds it is advisable to keep well offshore.

At night, in clear weather, vessels approaching the coast will generally sight one of the primary seacoast lights when in from 12 to 16 fathoms water, or, if near the entrance of Delaware Bay, the light-vessels marking Five Fathom Bank will be made when in about 18 fathoms.

Standing along the shore one light, if not more, should generally be in sight. The large number of coasting vessels and steamers passing up and down this coast make it necessary to keep a bright lookout to prevent collisions.

For tidal currents along the coast of New Jersey, see page 31.

Breakers.—Gales from **NE.** to **SE.** cause heavy breakers on the beach and outlying shoals along this coast; the sea breaks in about 4 fathoms of water, and shoals of this depth or less are usually marked by breakers during easterly gales. The bars at the entrance of the inlets are then impassable, and even in comparatively smooth water, with a slight swell, they are defined by breakers. The heavest surf on the beach is on the flood near high water of spring tides and right after a heavy easterly gale; the least surf is encountered on the ebb near low water. This fact is taken advantage of by life-saving crews and fishermen when putting off from or landing on the beaches. The farthest offshore breakers are to the southeastward of Brigantine Inlet and Ludlam Beach Lighthouse, and on Five Fathom Bank, at the two former places about 4½ miles from the shore; along the whole ridge of Five Fathom Bank the sea breaks only in very severe gales. A very heavy surf makes on the beaches after a southeasterly gale followed by a sudden shift of wind to the **NW.**

SAILING DIRECTIONS, NEW YORK BAY ENTRANCE TO DELAWARE BAY ENTRANCE.

1. ***From Scotland Light-vessel to Five Fathom Bank Light-vessel.—For vessels of the deepest draft.***—Bring Scotland Light-vessel to bear **N.** ½ **E.** astern and steer **S.** ½ **W.** about 5½ miles from the light-vessel, or until the Navesink Lighthouses bear **NW.** Then make good a **S.** by **W.** ¼ **W.** course for 36¼ miles; Barnegat Light should then bear abeam distant nearly 4½ miles.

From this position a **SSW.** ¾ **W.** course made good for 63½ miles will lead to a position nearly ½ mile to the eastward of Five Fathom Bank Light-vessel. Then, if bound to Chesapeake Bay, follow the directions in section 1, sailing directions from Delaware Bay Entrance to Chesapeake Bay Entrance, in another part of this volume. If bound into Delaware Bay, follow the directions in section 1, sailing directions Delaware Bay and River.

The least depth of water on these courses is about 7 fathoms, which will be found in several places between Sandy Hook and Absecon Lighthouse; to the southward of the latter about 10 fathoms is the least depth. In strong easterly winds, when abreast the coast between Tucker Beach and Absecon lighthouses, special care is necessary not to be set inshore on to the shoals off Brigantine Beach. Consult the General Remarks on approaching and standing along the coast from Sandy Hook to Cape May, just preceding.

Remarks.—The **S.** ½ **W.** course leads nearly parallel to the coast and about 2½ miles from it; when the Navesink Lighthouses bear **NW.** Seabright will be a little abaft the beam. The **S.** by **W.** ¼ **W.** course will draw a vessel offshore very gradually; having stood on it about 3½ miles, Long Branch will be abeam, 5 miles farther Asbury Park, and 15½ miles farther Lavalette City will be abeam. When Barnegat Lighthouse bears abeam, the bell buoy off the inlet should be nearly in range with the lighthouse and distant about 2 miles on the starboard beam.

On the **SSW.** $\frac{3}{4}$ **W.** course Tucker Beach Lighthouse should be at least 5 miles distant when abeam; the course will draw a vessel offshore gradually until about 2 miles to the eastward of the whistling buoy about midway between Tucker Beach and Absecon lighthouses; the vessel will then draw off more rapidly and pass $1\frac{1}{4}$ miles to the eastward of Northeast End light-vessel.

Dangers.—Shrewsbury Rocks make out from the shore about $3\frac{1}{4}$ miles to the southward of Navesink Lighthouses. There is from 14 to 18 feet of water on the rocks, which extend in a broken line nearly $1\frac{1}{4}$ miles from the beach and are marked off their outer end by a buoy (red and black horizontal stripes).

A 19-foot spot lies about $3\frac{1}{2}$ miles **S.** $\frac{1}{2}$ **E.** from Barnegat Lighthouse and $1\frac{3}{4}$ miles from the beach; there are depths of $4\frac{1}{2}$ to $5\frac{1}{2}$ fathoms inshore of this spot.

Between Barnegat Lighthouse and Tucker Beach Lighthouse there are several spots, with 18 feet of water over them, lying from $\frac{5}{8}$ mile to 1 mile from the beach.

Brigantine Shoal makes off from Brigantine Beach about $6\frac{1}{2}$ miles to the southward of Tucker Beach Lighthouse and, with depths of 6 to 11 feet, extends 2 miles from the shore. At its outer end is a black buoy which bears **ENE.** $\frac{3}{4}$ **E.** from Absecon Lighthouse, distant $5\frac{1}{4}$ miles. About $2\frac{1}{2}$ miles to the eastward of this buoy is a shoal with 26 to 30 feet of water and about $\frac{3}{4}$ mile in diameter; and $1\frac{3}{4}$ miles **SE.** $\frac{3}{4}$ **S.** from the buoy is Brigantine Shoal black whistling buoy.

From abreast of Tucker Beach Lighthouse to Absecon Lighthouse there are depths of 4 to 5 fathoms $3\frac{1}{4}$ miles from the shore, and in heavy gales from the eastward this stretch of the coast should be given a good berth even by vessels of moderate draft.

Five Fathom Bank is about 9 miles long in a **N.** $\frac{3}{4}$ **E.** and **S.** $\frac{3}{4}$ **W.** direction and has a width of about $1\frac{3}{4}$ miles at its widest parts, and depths of less than 5 fathoms. The least water, 15 feet, is near the middle of the shoal about 3 miles from its southern end; about $\frac{5}{8}$ mile to the northeastward of this 15-foot spot, in 18 feet of water is Five Fathom Bank buoy (red and black horizontal stripes with F. F. B. in white letters). The northern end of Five Fathom Bank, with depths of $3\frac{1}{2}$ to $4\frac{1}{4}$ fathoms, lies 8 miles **ESE.** $\frac{1}{2}$ **E.** from Hereford Inlet Lighthouse, and 6 miles **ESE.** $\frac{1}{2}$ **E.** from this end of the bank is Northeast End Light-vessel (see table, page 14). To the westward of the light-vessel between it and Five Fathom Bank are several detached spots with 5 fathoms over them. The southern end of Five Fathom Bank lies $15\frac{3}{4}$ miles **SE.** by **E.** $\frac{3}{8}$ **E.** from Cape May Lighthouse and is marked by Twenty-one Foot Shoal buoy (red, No. 2). About $4\frac{1}{4}$ miles **SE.** by **S.** from this buoy is Five Fathom Bank Light-vessel (see table, page 14). To the northwestward of each light-vessel there is a black station buoy, the northern marked N. E. E. and the southern F. F. B. in white letters. In strong easterly gales the shoaler parts of Five Fathom Bank are marked by heavy breakers.

1A. ***From Sandy Hook to Delaware Bay Entrance, Passing Inside of Five Fathom Bank.—For vessels of 18 feet or less draft.***—Having come out of New York Bay by the South Channel, leave False Hook (SE. end) buoy about 250 yards on the starboard hand and steer **S.** nearly 5 miles. Then make good a **S.** by **W.** $\frac{3}{8}$ **W.** course for $36\frac{3}{4}$ miles. Barnegat Lighthouse should then be abeam, distant $2\frac{1}{2}$ miles, and the bell buoy close on the starboard hand.

From the bell buoy off Barnegat make good a **SSW.** $\frac{7}{8}$ **W.** course for $25\frac{1}{2}$ miles, when the whistling buoy off Brigantine Shoal should be close aboard on the starboard hand. From the whistling buoy make good a **SW.** $\frac{1}{4}$ **W.** course for $44\frac{1}{4}$ miles. Cape May Lighthouse should then bear **N.** by **W.**, distant nearly $6\frac{3}{4}$ miles, and a **W.** $\frac{1}{2}$ **S.** course should lead straight in on the Delaware Breakwater range.

Or, if desiring to pass closer inshore. From the whistling buoy off Brigantine Shoal make good a **SW.** by **W.** course for $22\frac{3}{8}$ miles. Ludlam Beach Lighthouse should then bear abeam, distant $2\frac{1}{4}$ miles. From here a **SW.** by **S.** course made good for $9\frac{3}{4}$ miles will bring Hereford Lighthouse abeam, distant $2\frac{1}{4}$ miles; then a **SW.** $\frac{1}{2}$ **W.** course made good for $14\frac{1}{4}$ miles should lead on to the Delaware Breakwater Range, and the course into Delaware Bay on that range is **W.** $\frac{1}{2}$ **S.**

If bound to the southward along shore, stand on the **SW.** $\frac{1}{4}$ **W.** course about 51 miles from the whistling buoy off Brigantine Shoal, or when Hereford Lighthouse bears **NW.** by **W.** distant $2\frac{1}{4}$ miles make good a **SW.** $\frac{1}{2}$ **W.** course for 19 miles, and then follow the directions in section 1, paragraph II, sailing directions for standing along the coast between Delaware Bay and Chesapeake Bay.

Remarks.—The **S.** course leads nearly parallel to the coast and $1\frac{5}{8}$ miles from it. When the course is changed to **S.** by **W.** $\frac{3}{8}$ **W.** the Navesink Lighthouses should bear **NW.** Care should be taken to pass to the eastward of Shrewsbury Rocks buoy; after passing the buoy the **S.** by **W.** $\frac{3}{8}$ **W.** course leads straight for the bell buoy off Barnegat Inlet, and the least depth on the sailing line is about 7 fathoms.

The **SSW.** $\frac{7}{8}$ **W.** course leads for the whistling buoy off Brigantine Shoal and passes to the eastward of a 19-foot spot lying $1\frac{3}{4}$ miles offshore, about $3\frac{1}{2}$ miles to the southward of Barnegat Lighthouse. From abreast of Tucker Beach Lighthouse to the whistling buoy the sailing line leads about 4 miles from the beach and passes between shoals having a depth of little over 4 fathoms.

The **SW. ¼ W.** course leads nearly ¾ mile to the eastward of the shoals lying off Ludlam Beach Lighthouse, and leaves Ludlam Beach Lighthouse 5¼ miles and Hereford Inlet Lighthouse 2¾ miles on the starboard beam, and McCrie Shoal buoy 1¾ miles on the port beam. The least water, 4 to 6 fathoms, will be found when Cape May Lighthouse bears about **WNW. ¼ W.**

When standing closer inshore from the whistling buoy off Brigantine Shoal, on the **SW.** by **W.** course, and just before Ludlam Beach Lighthouse bears abeam, Sixteen-foot Lump buoy should be left ⅝ mile on the port hand. On the **SW.** by **S.** course about 1½ miles before Hereford Inlet Lighthouse bears abeam, the bell buoy off the inlet should be left ½ mile on the starboard hand. On the **SW. ½ W.** course Fifteen-foot shoal buoy should be left about ⅝ mile on the starboard hand. About 4½ fathoms is the least water found if the sailing lines are closely followed.

Dangers.—The eastern ends of **False Hook, Oil Spot,** and **Outer Middle Ground,** lie from 1 to 1½ miles to the eastward of Sandy Hook, and are described on page 35.

Shrewsbury Rocks and the dangers along shore as far as Absecon Inlet are described under section 1, preceding.

Sixteen-foot Lump is about 3¾ miles **SE. ½ S.** from Ludlam Beach Lighthouse and is marked by a buoy (red and black horizontal stripes). The lump is at the southwestern end of a shoal, with depths of 4 to 5 fathoms over it lying from 3 to 5 miles offshore abreast of Ludlam Beach Lighthouse. This shoal is about 1½ miles long in a **NE.** and **SW.** direction, about 1⅜ miles wide on an **E.** and **W.** line, its northeastern end bearing **ESE. ¼ E.,** distant 5 miles from Ludlam Beach Lighthouse.

Five Fathom Bank is described under section 1, preceding. To the westward of this bank, until within 1 mile of the shore, the depth ranges from 6 to 9 fathoms, although there are a number of spots with 4 to 5 fathoms over them, but which would not be dangerous, except in very heavy gales, to any vessels of a draft that would warrant them coming inside of Five Fathom Bank.

Lying about 1½ miles from the shore, about 3¾ miles to the southward of Hereford Inlet Lighthouse, is a narrow shoal with 3 to 4 fathoms over it.

McCrie Shoal lies 5½ miles to the southeastward of Cape May; it has a least depth of 17 feet and is marked on its southern side by a buoy (red, No. 2), which is about ½ mile to the eastward of the Seventeen-foot Lump and bears **SE. ½ S.,** distant 6½ miles from Cape May Lighthouse. (*See Supplement, Art. 17.*)

The extensive shoals lying to the southward of Cape May are described under the sailing directions for Delaware Bay.

DELAWARE BAY*

is, properly speaking, only an expansion of the lower part of Delaware River, the dividing line being a line from the mouth of Mahon River to Egg Island Point, or the parallel of 39° 10′ 40″ N. The entrance to the bay from seaward, between Cape May on the north and Cape Henlopen on the south, is 10 miles wide, but the extensive shoals extending over 5 miles to the southward from Cape May leave a deep channel in to the bay less than 4 miles wide. In referring to the entrance to the bay, "The Capes" or "The Capes of the Delaware" are the terms commonly used.

The bay is of irregular shape, its greatest dimensions in a **NE.** by **E.** and **SW.** by **S.** direction being 25 miles, and in **NNW.** and **SSE.** direction 22 miles; at its northern extremity, between the mouth of Mahon River on the west and Egg Island Point on the east side, it is only 12 miles wide, but just below this it has a width of 24 miles. Extensive shoals with depths ranging from a few feet to 18 feet occupy a greater part of the bay, but there is a deep and well-marked channel leading to the entrance of Delaware River.

Cape May, the northern point at the entrance to the bay, is easily recognized by the large number of houses on its eastern and southern faces, and by Cape May Lighthouse (see table, page 14). Cape May Point is the summer resort on the southwestern extremity of the cape, and Cape May City is about 2 miles to the eastward, built close to the beach. The large hotels at both these summer resorts are prominent objects. The whole peninsula of Cape May is lowland, the highest hillocks being less than 30 feet in height.

From Cape May the eastern shore of the bay trends about 13 miles in a general **NNE.** direction to the mouth of **Goshen Creek.** This creek is the approach to the village of Goshen, about 1 mile above the entrance; the creek is obstructed by a bar showing bare at low water, but there is 3 to 5 feet at low water in the channel to the village, and a channel is to be dredged to that depth across the bar. The land between Cape May and Goshen Creek is generally low (rising in some places to a height of about 20 feet), and unbroken except by a number of small unimportant creeks. At the mouth of Goshen Creek the shore turns to the northward and westward for 2 miles and then trends in a **WNW. ½ W.** direction for 5 miles to **East Point,** on which is Maurice River Lighthouse (see table, page 14). From this point the shore trends to the northward about 1 mile and then curves to the westward to **Egg Island Point,** the point 5¼ miles to the westward of East Point and marked by Egg Island Lighthouse (see table on page 16). The bight thus formed and the northern part of the bay in

*Shown on charts **376,** scale $\frac{1}{400,000}$, price $0.50; **124,** scale $\frac{1}{80,000}$, price $0.50.

the vicinity of East Point is known as **Maurice River Cove.** Maurice River empties into the northeastern part of the cove about 1 mile to the northward of East Point, and is treated separately in another part of this volume. Nearly the whole northeastern part of the bay consists of flats which are under oyster cultivation; numerous long slender stakes, marking the different oyster beds, are found on the flats.

Cape Henlopen, the southern point at the entrance of the bay, is a high mass of white sand utterly destitute of vegetation, although there is a thick grove of trees in the hollow behind the bluff, some portions of which may be seen over the latter. The most prominent object on the cape is Cape Henlopen Lighthouse (see table, page 14) about 1 mile to the southward of the pitch of the cape, on a bare white sand hillock. To the westward of Cape Henlopen there is a breakwater (on which are two lighthouses and a lighted beacon) forming a harbor of refuge, generally known as Delaware Breakwater Harbor (see description). About 1¼ miles to the northward of the cape is the uncompleted breakwater which is to form the new harbor of refuge. This breakwater when completed will extend from "The Shears" to within 1 mile from the point of the cape.

From the northern extremity of Cape Henlopen the shore of the bay curves to the southwestward, and then westward for about 2½ miles to the town of **Lewes,** which is situated a little more than ¼ mile back from the beach. Along the shore between the cape and Lewes, there are three long wharves. From abreast Lewes the shore trends about 13 miles in a general **NW.** by **N.** direction to the mouth of Mispillion Creek, marked by Mispillion Creek Lighthouse (see table, page 14).

Broadkill Creek, the entrance to which is 5 miles above the long pier at Lewes, has a bar at the entrance with only 2 feet over it at low water, but inside the bar it has a navigable depth of 6 feet to the town of **Milton,** 12 miles above its mouth. Vessels of as much as 7 feet draft cross the bar at high water, generally employing a towboat. A bridge crosses the creek 4 miles below Milton; width of draw, 38 feet.

Mispillion Creek can be entered at high water by vessels of 6 feet draft, and this draft can be taken up to the town of **Milford,** about 12 miles above its mouth. There are several shipyards on the creek where vessels of as much as 1,000 tons register were built; sailing vessels that enter usually employ a towboat.

From Mispillion Creek Lighthouse the shore trends to the northward 2 miles, and then in a **NW.** by **N.** direction to Bowers Beach, between Murderkill Creek and St. Jones River.

Murderkill Creek empties into the western side of the bay 7¾ miles to the northward of Mispillion Creek Lighthouse and about ½ mile to the southward of St. Jones River. The creek is navigable for 7¾ miles to the town of **Frederica** by vessels of 5 feet draft, but the bar at the entrance can only be crossed at high water. The channel is narrow and crooked, but has been somewhat straightened by 6 canals which cut off bends. Local knowledge is necessary for the navigation of the creek. Two post-lights are placed on the north bank of the creek just inside the entrance, and form a range for entering through the dredged channel over the bar.

St. Jones River empties into the bay on its western side about 6⅝ miles to the southward of Mahon River Lighthouse; the entrance and channel have been improved by the U. S. Government so as to make a channel from 40 to 100 feet wide and 6 feet deep at low water to the city of **Dover,** which is 18 miles above the mouth of the river. The town of **Lebanon** is 10½ miles, and the village of **Florence** 6¾ miles, above the entrance to the river; at each there is a drawbridge with draws about 34 feet in width. The mean rise and fall of tides at the entrance is about 5½ feet; at Lebanon, 2½ feet, and at Dover, 1 foot. Two post-lights are placed on the north bank of the river at its entrance, and form a range for entering through the dredged channel over the bar. Strangers should not enter without a towboat or pilot.

From the mouth of St. Jones River the shore trends in a **N. ½ E.** direction about 6¾ miles to Mahon River Lighthouse (see table, page 16). The entire western shore of the bay is generally low and marshy, with extensive shoals making off a long distance from it.

Mahon River (or popularly known as Mahon Ditch) is marked on the western side of its entrance by Mahon River Lighthouse. The river is an important harbor of refuge for the small craft engaged in oystering and fishing in this part of the bay, the depth inside the bar being 10 to 14 feet and the channel about 600 feet wide. The principal difficulty is at the entrance, where there is a bar with only 4 feet of water over it; this prevents most vessels from entering, except near high water. The mean rise and fall of tides is 5·8 feet, and high water occurs about 4 hours and 31 minutes earlier than at Philadelphia.

Channels.—There are two principal channels into the bay; the *Main Channel,* between South Shoal and Cape Henlopen, is the one generally used by deep-draft vessels and strangers; it has a width of about 3¾ miles, and is the approach from seaward to Breakwater Harbor and the Main Channel up the bay. *Cape May Channel* is the other one, and is only used by coasting vessels familiar with its buoyage and currents, or by small craft. This channel leads in a northwesterly direction, between two shoals lying to the southward of Cape May, up to the western side of Cape May Point, and has a least depth of about 14 feet at its eastern end. Several minor channels lead between the numerous shoals lying to the southward and westward of Cape May; of these the Bay Shore Channel, leading along the western shore of Cape May, and Ricords Channel, leading

TREASURY DEPARTMENT

DELAWARE BAY

PART OF CHART NO. 376

Scale $400\frac{1}{000}$

Nautical Miles.

5 4 3 2 1 0 5 10 15 20 25

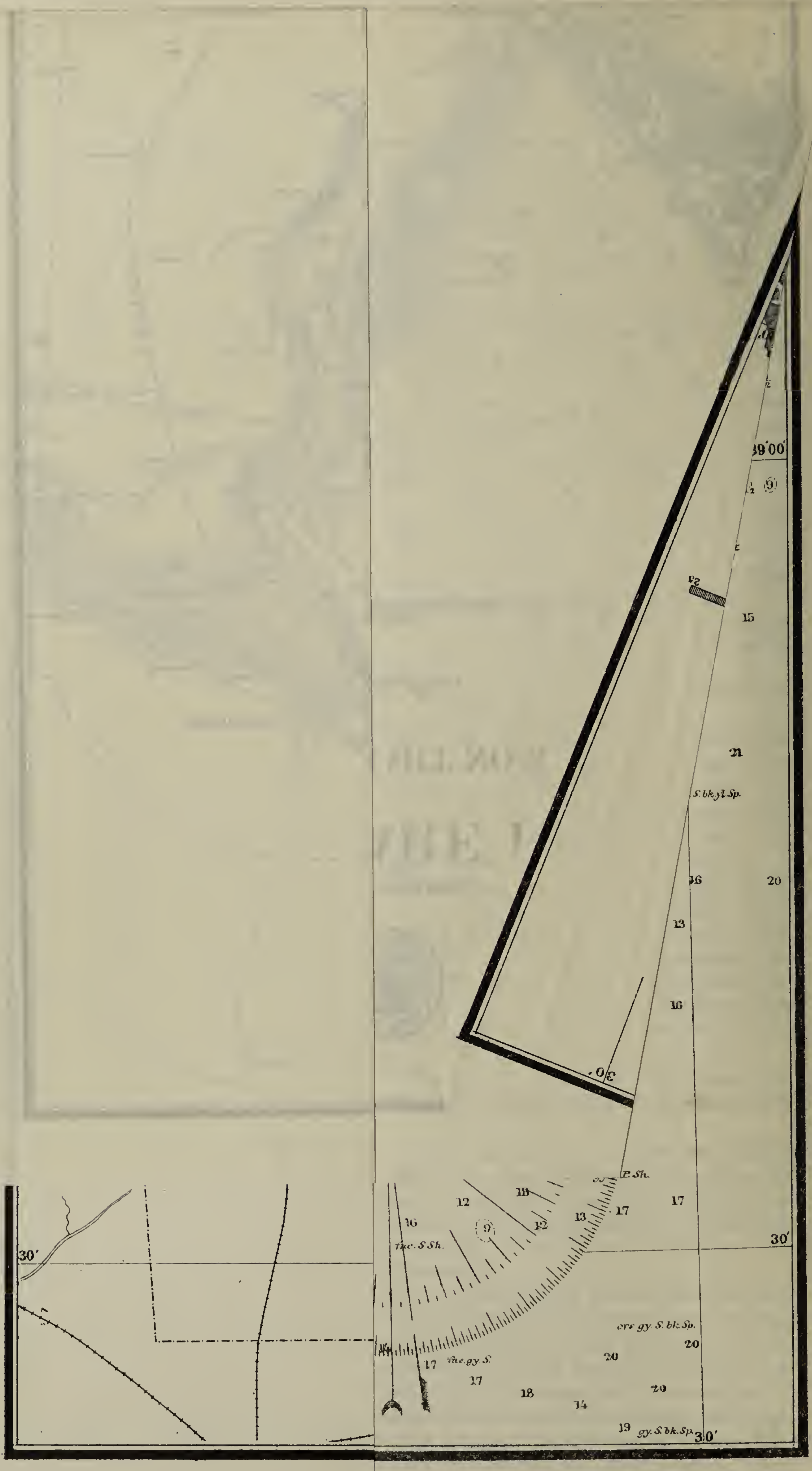
PHILADELPHIA · Camden · Gloucester · Westville · Glendora · Woodbury · Swedesboro · Glassboro · Elmer · Salem · Alloway · Vineland · Bridgeton · Millville · Port Elizabeth · Port Norris · Seaville · Ocean View · Sea Isle City · Ocean City · Longport · Cape May C.H. · Mayville · Holly Beach · Cape May · Lewes · Rehoboth · Fenwick I. · Indian R. Inlet · Harrington · Milford · Georgetown · Seaford · Delaware City · Odessa · Townsend · Smyrna · Clayton · Dover · Lebanon · Glasgow · Newark · Wilmington · New Castle · Christiana · Stanton · New Port · Penn's Grove · Old Man's Pt. · Bellevue · Marcus Hook · Chester · Media · Landsdown · Darby · Ridley Cr. · Crum Cr. · Chester Cr. · Darby Cr. · Cooper Cr. · Pensauken Cr. · East Camden P.R.R. · C.A.R.R. · Glouc. City R.R. · Big Timber Cr. · Red Bank · Eagle Pt. · League I. · Ft. Mifflin · Tho. R. · Pautshom · Billingsport · Mantua Cr. · Raccoon Cr. · Thompsons Pt. · Deep Water Pt. · Upper Penn's Neck · Lower Penn's Neck · Penn's Neck Funks Pt. · Pennsville · Ft. Del. · Reedy Pt. · Delaware City · Porter · Del. and Ches. Canal · Port Penn · Alloway Cr. · Salem Cr. · Fishing Creek · Fishing Bay · Egg I. Pt. · Dennis Cr. · Corson Inlet · Townsend Inlet · Great Egg Hbr. R. · Great Egg Hbr. · Buckshoe R. · Abaconk R. · Reeds R. · Lakes R. · Mantua Cr. · Maurice R. · Ewings Neck · Shipsons I. · Nantuxent Cr. · Nantuxent Neck · Van Dyke Cr. · Bacons Neck · Bacons Ditch · Bacons Ditch Cr. · Back Neck · Bayside · Duck Cr. · Bombay Hook · Bombay Hook Pt. · Ben Davis Pt. · Goose Pt. · Little Bombay Hook · Deep Water Pt. · Jones R. · Murderkill Neck · Murderkill Cr. · Mispillion Cr. · Broad Kill · Indian R. · Slaughter Cr. · Duck Cr. · Jones Cr. · Stony Pt. · Liston's Pt. · Allowa Cr. · Atsayuunk Cr. · Port Penn · Reedy R. · Ft. Del. · Salem Cr. · Fishing Creek · Fishing Bay · Egg I. Pt. · Dennis Cr. · Corson Inlet · Townsend Inlet · Great Egg Hbr. R. · Great Egg Hbr. · Buckshoe R. · Abaconk R. · Reeds R. · Lakes R. · Mantua Cr. · Maurice R. · Ewings Neck · Shipsons I. · Nantuxent Cr. · Nantuxent Neck · Van Dyke Cr. · Bacons Neck · Bacons Ditch · Bacons Ditch Cr. · Back Neck · Bayside · Duck Cr. · Bombay Hook · Bombay Hook Pt. · Ben Davis Pt. · Goose Pt. · Little Bombay Hook · Deep Water Pt. · Jones R. · Murderkill Neck · Murderkill Cr. · Mispillion Cr. · Broad Kill · Indian R. · Slaughter Cr. · Duck Cr. · Jones Cr. · Stony Pt. · Liston's Pt. · Allowa Cr. · Atsayuunk Cr. · Port Penn · Reedy R. · Ft. Del.

Cent. R.R. of N.J. · W. Jersey R.R. · P.W. & B. R.R. · W.C. & A. R.R. · N. & D.C. R.R. · P.W. & B. R.R. · B. & E. Shore R.R.

TOURTEENFOOT BANK (13T) · BRANDYWINE SHOAL (13B) · SHIP JOHN (13B) · CROSS LEDGE · FIVE FATHOM BANK · Fenwick I. Shoal · Isle of Wight Shoal · McCries Shoal · Cape Henlopen · Cape May · Delaware Bay · Atlantic Ocean

MAGNETIC COMPASS · VARN 6° W IN 1900 · ANNUAL INCREASE 3'

UNITED STATES COAST AND GEODETIC SURVEY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between Crows Shoal and Mummy Shoal, are the outlets from Cape May Channel into the bay. These channels are well marked by buoys, but the Main Channel is the one that should be used at night. The strong and variable tidal currents in the channels off Cape May make it necessary for sailing vessels to have a strong favorable wind when navigating them.

Anchorages.—The anchorage behind Delaware Breakwater is one of the most important harbors of refuge on the Atlantic Coast, but its area is limited, as is also the depth of water, which ranges from 12 to 20 feet. In heavy easterly gales frequently every available space for an anchorage behind the breakwater is occupied. In northwesterly gales, vessels not provided with good ground tackle sometimes drag ashore, the harbor being exposed to winds from that direction.

Deep-draft vessels usually anchor along the Main Channel above Fourteen-Foot Bank Lighthouse, or if the weather is fair may come to anchor to the southward of "The Shears," the extensive shoal which lies to the northward of the breakwater.* There is good anchorage and shelter from easterly winds on the west side of Cape May, but this anchorage is seldom used on account of the numerous shoals in this part of the bay.

Pilots for Delaware Bay and River will be found cruising in a steam pilot boat between Cape May and Cape Henlopen. Fishermen can generally be had to pilot vessels desiring to enter the creeks flowing into the bay or river (see pilot laws and regulations in Appendix I).

Towboats will sometimes be found cruising in the lower part of the bay or at Delaware Breakwater Harbor. There are no fixed rates for towing. A large towboat is usually stationed in Breakwater Harbor from September to May to assist vessels in distress.

Quarantine.—There is a National Quarantine station and hospital on the south side of Delaware Breakwater Harbor. Vessels desiring it are boarded, between sunrise and sunset, by a Marine Hospital surgeon, who goes alongside in a launch while the vessels either anchor or lie to at the quarantine anchorage to the northward of the breakwater. The regulations of the U. S. Marine Hospital Service, which are changed from time to time as occasion requires, govern the boarding surgeon as to the inspection of vessels from different ports. There is also a National Quarantine station off the eastern shore of Reedy Island, in Delaware River, where vessels, that have not been granted pratique at the Breakwater station, are boarded and detained until they receive pratique.

The Quarantine anchorage in Delaware Bay is south of The Shears, and to the northward and northwestward of the breakwater.

The **State Quarantine Station** is at Marcus Hook, just below Chester; it is marked by a tall flagstaff with a yellow flag. While the State Quarantine is in force, all vessels entering the port of Philadelphia are required to stop when abreast of Marcus Hook to permit the State Quarantine Officer to board.

There is a **reporting station** on Delaware Breakwater, from which the observer at the station reports all vessels entering and passing out of the bay, and those standing along the coast that he can recognize by their number.

Supplies.—Fresh provisions can be had at Lewes or Cape May Point; water can be had from some of the towboats in the bay and at Lewes. Ship chandler's stores can be had at Lewes; if required in large quantities they should be ordered from some of the large cities up the river.

Repairs to the hulls of small wooden vessels can be made at the shipyards in Mispillion Creek and Maurice River. (See also Repairs, under heading Delaware River.)

Ice.—In ordinary winters vessels in the bay are not endangered by ice, although more or less drift ice will be met by those standing up into Delaware River; in severe winters, large quantities of ice are brought down by the current and prevailing northerly winds, and sailing vessels, if caught in it, are apt to be set on the shoals or carried to sea. (See also Ice, under the heading Delaware River.)

Currents.—The tidal currents generally follow the direction of the channel and are strong enough to be considered by those navigating the bay and river. In the main channel 3½ miles **NE.** ½ **N.** from Cape Henlopen Lighthouse, the current turns to flood 1 hour and 50 minutes after the time of low water at the Breakwater, and turns to ebb 45 minutes after the time of high water at the Breakwater. The maximum velocity of the flood is 1·9 knots and of the ebb 2·3 knots. (See also the tables on page 24.)

Tides.—See the table on page 21, for tidal data of Delaware Breakwater.

*A breakwater is being built on the southeast point of "The Shears," and is intended for a harbor of refuge for vessels drawing too much water to anchor behind Delaware Breakwater.

DELAWARE RIVER*

takes its rise in the southern part of the State of New York and flows in a general southerly direction—forming the boundary between the State of Pennsylvania and the States of New York and New Jersey—for about 250 miles to its junction with Delaware Bay.

The river has numerous extensive shoals, but there is a good and excellently marked channel with a least depth of about 22 feet at ordinary low water as far as the city of Philadelphia, which is 86 miles above the entrance to Delaware Bay. Improvements are in progress to deepen and widen the channel where it has a depth of less than 26 feet. Trenton, 114 miles above the entrance to Delaware Bay, is the head of navigation; to it a draft of 9 feet can be taken at high water. The banks of the river are mostly low and in many places marsh extends some distance back from them. There are a number of cities, towns, and villages along its banks (and on its tributaries), the most important of which are Wilmington, Chester, Philadelphia, Camden, Bordentown (important as being at the entrance to the Delaware and Raritan Canal), and Trenton. Many small streams flow into the river, but most of them are unimportant; those considered of sufficient importance are treated under separate headings.

From its junction with Delaware Bay, where the river is about 12 miles wide, it extends, narrowing gradually in a **NW.** by **N.** direction for about 21 miles, to abreast **Stony Point**, where it is only $2\frac{3}{4}$ miles in width. Both banks of this stretch of the river are generally low and marshy, and are broken by the entrances of numerous small creeks; those entering from the eastward, named in order from the southward, are: Straight, Fishing, Fortescue, Sow and Pigs, Padgetts, Nantuxent, Cedar, Back, Cohansey, Stow, Mad Horse, and Hope creeks. From the westward the streams entering the river are: Dona River, Leipsic River, Smyrna River, Black Bird Creek, and Appoquinimink Creek. Extensive shoals make out from both banks of the river, leaving a deep channel about 1 mile in width. Abreast of Bombay Hook Lighthouse the channel is known as Bombay Hook Roads, and is much used as an anchorage by windbound vessels, either entering or leaving the river. The depths range from $3\frac{1}{4}$ to 5 fathoms, and the holding ground is good.

Dona River empties into Delaware River from the westward, about $2\frac{3}{4}$ miles above Mahon River Lighthouse. It is one of the entrances to the narrow estuary which, commencing at Mahon River, extends to the northward to Bombay Hook. The bar at the entrance to the river has a depth of about 4 feet over it, but inside the entrance there is a depth of about 5 feet to Dona Landing, a village about $1\frac{1}{2}$ miles above its mouth.

Leipsic River is about $1\frac{1}{4}$ miles above Dona River entrance, and is the approach to the town of **Leipsic**, 10 miles above its mouth. The river is very crooked and narrow, but 6 feet can be carried up to Leipsic by those well acquainted with the channel. The rise and fall of tides at the entrance is 6 feet and at Leipsic about 3 feet.

Smyrna River, formerly known as Duck Creek, empties into the western side of Delaware River about $4\frac{1}{2}$ miles above Bombay Hook Point. The entrance marked by Bombay Hook Lighthouse (see table, page 16) is obstructed by a shallow bar, but the river channel is being improved by dredging, and a draft of $6\frac{1}{2}$ feet can be taken to **Smyrna Landing**, about 9 miles above the mouth of the river. At **Flemings Landing**, 3 miles above the entrance, is a bridge with draw 35 feet wide; **Rothwells Landing** is $7\frac{3}{4}$ miles above the entrance and $1\frac{1}{4}$ miles below Smyrna Landing. The town of **Smyrna** is $\frac{3}{4}$ mile above Smyrna Landing. A local pilot should be taken by any stranger desiring to enter.

Cohansey Creek is fully described in another part of this volume.

Stow Creek empties into the eastern side of Delaware River, about $3\frac{5}{8}$ miles above Cohansey Lighthouse. There is 4 feet of water on the bar at the entrance and about 8 feet can be taken into the creek at high water.

Appoquinimink Creek empties into the western side of Delaware River, 6 miles above Bombay Hook Lighthouse, and about $3\frac{1}{4}$ miles below Reedy Island. The entrance is obstructed by a bar which can be crossed only at high water, but the creek is navigable for light draft vessels to the village of **Odessa**, $7\frac{3}{4}$ miles above its mouth. The channel is narrow and crooked and requires local knowledge; sailing vessels usually employ a towboat.

From Stony Point to Reedy Point, about 6 miles above, the width of Delaware River varies from 3 to $1\frac{3}{4}$ miles, and its course from the latter to the former point is nearly due south. About midway between the two points, and in the western part of the river, there is a small island known as **Reedy Island**; on the southern extremity of the island is Reedy Island Lighthouse (see table, page 16), from which a dike extends a little more than 1 mile in a **S.** by **W.** $\frac{1}{2}$ **W.** direction. On the eastern side of the island is a station of the National Quarantine and a tidal indicator; the latter can be plainly seen by vessels passing down the river to the eastward of Reedy Island; the indicator faces to the northeastward. (For a description of the tidal indicator, see page 28.)

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* Shown in parts on charts **125, 126**, scale of each $\frac{1}{80,000}$, price of each $0.50.

A channel with a least depth of 16 feet, leads along to the westward of this dike and Reedy Island, to abreast the village of **Port Penn**, on the west bank of the river abreast the island. This channel, known as **Reedy Island Harbor**, affords good anchorage in 19 to 24 feet of water, and is much nsed in the winter when ice is running in Delaware River. Several creeks enter the river from the eastward between Stony Point and **Elsingsboro Point**, which is 5 miles to the northward of the former. **Reedy Point** is about 1 mile above Elsingboro Point and on the west side of the river.

Alloway Creek empties into the eastern side of Delaware River due E. from Reedy Island Lighthouse and 5¾ miles below Fort Delaware. There is a depth of 6 feet in the channel for a distance of 3½ miles from the entrance; above this the channel is being improved to obtain a 6-foot channel to the town of **Quinton**, which is 8¾ miles above the mouth of the creek and at the head of navigation.

Salem Cove is the shallow bight on the eastern side of the river abreast Reedy Point. Salem Creek, flowing into the cove, is described in another part of this volume.

The Delaware River bends to the westward for a few miles just above Reedy Point, and then extends in a general northeasterly direction for 35 miles to the City of Philadelphia. In this bend, near the middle of the river, is a small island called **Pea Patch Island.** The southern part of the island is occupied by **Fort Delaware**, the northern part is marsh; shoals make off to the southward, westward, and northward from the island, but there is a well-marked channel to the eastward and westward of them; the eastern, or main, channel is the broader and has deeper water; the western is known as Bulkhead Shoal Channel. The land on the eastern side of the river to the northeastward of Fort Delaware is known as **Penns Neck.** A curved jetty extends to the westward from Penns Neck nearly to the edge of the channel.

Delaware City is on the west bank of the river, 55 miles above The Capes of the Delaware and 33 miles below Philadelphia. The eastern entrance to the **Delaware and Chesapeake Canal** is at Delaware City. This canal is about 12 miles in length, has locks 220 feet long and 24 feet wide, and allows a draft of 9 feet; a number of bridges cross it, but all have draws and do not necessitate the striking of topmasts. The western entrance to the canal is at Chesapeake City; the canal here connects with Back Creek, a tributary to Elk River, which flows into the head of Chesapeake Bay. This canal, by connecting Delaware River with Back Creek, forms a continuous water route (for vessels of 9 feet or less draft) from Philadelphia to Baltimore, the distance being 95 miles, while the distance by way of The Capes of the Delaware and Capes of the Chesapeake is over 350 miles.

New Castle is on the western bank of the Delaware River 59½ miles above The Capes. About 3½ miles above New Castle and on the eastern side of the river is a point known as **Deep Water Point**, on which are the towers of Deep Water Point Range (see table, page 16).

Christiana River is the stream entering Delaware River from the westward about 64 miles above The Capes. The northern point at the entrance is marked by Christiana Lighthouse, and on the end of the jetty which extends to the southeastward form the point is Christiana Beacon (see table, page 16).

On Christiana River, about 1¼ miles above its mouth, is the city of Wilmington, which has large manufacturing interests. About 14 feet can be taken, at ordinary low water, into the river and up to the wharves of the ciiy. Christiana River, Wilmington Harbor, is more fully described in another part of this volume.

Lying nearly in the middle of the Delaware River, just above the mouth of Christiana River, are **Cherry Island Flats**, which are about 2¾ miles in length and partly bare at low water. There is a channel on each side of these flats: the eastern is the wider, but the western is the deeper, and besides being marked by buoys has a range (see Cherry Island Range, page 16) for guiding through the narrower part.

The village of **Penns Grove** is on the eastern bank of the river about 2½ miles above Deep Water Point.

Old Mans Creek empties into Delaware River from the eastward about 4½ miles above Christiana Lighthouse; it is of no commercial importance and requires local knowledge for entering through the narrow channel, which leads along the shore to the entrance of the creek.

About 5¼ miles above Christiana Lighthouse and in the middle of Delaware River is the southern point of **Marcus Hook Bar.** This shoal, which is nearly bare in places at low water, extends about 3¼ miles to Raccoon Island. The channel leads to the northward of the bar, but there is a narrow channel with a least depth of about 9 feet leading to the southward to the entrance of Raccoon Creek.

Marcus Hook, about 7½ miles above Christiana River entrance, on the north bank of the river, has wharves for the shipment of mineral oil; it is recognized by a number of large iron oil tanks, which stand a short distance back from the river bank, and by the State Quarantine Station.

Chester extends nearly 2 miles along the west bank of the river about 74 miles above The Capes; this city has many factories and machine shops, also several shipyards. The principal wharves extend out to the deep water of the river channel.

Raccoon Island is in the eastern part of the river (virtually forming, for a short distance, the eastern bank) abreast the lower part of the city of Chester. Raccoon Creek and marsh separate the island from the mainland.

Raccoon Creek, which empties into Delaware River to the eastward of Raccoon Island, is entered by a narrow channel along the southern shore of the island. The creek is the approach to the villages of **Bridgeport** and **Swedesboro**, the former being 1¾ and the latter 8¼ miles above its mouth. At Bridgeport two drawbridges cross the creek and at Swedesboro, which is the head of navigation for masted vessels, there are two close bridges. There is a depth of about 4 feet in the channel at low water for 4 miles from the entrance; 7 feet is the deepest draft of the vessels entering the creek.

Chester Island, lying nearly in the middle of Delaware River, just above the northern wharves of the city of Chester, is a low, marshy island, having a length of 1¼ miles and a width, at its widest part, of nearly ½ mile.

From abreast the entrance to Christiana River the channel of Delaware River follows the western bank for a distance of about 11½ miles to abreast the northeastern end of Chester Island. Here the channel becomes narrow and turns in an easterly direction, following the eastern bank for about 5 miles, the western part of the river being occupied by shoals and the low, marshy island known as **Tinicum Island**. Above this island the channel continues narrow and crooked (with shoals on one side or the other), but is well marked by ranges and buoys as far as the city of Philadelphia.

Mantua Creek is a narrow, crooked stream, emptying into the southern side of Delaware River about 2 miles below League Island. The creek is navigable for masted vessels up to the village of **Berkley**, 5¾ miles, and for canal boats to the village of **Mantua**, which is the head of navigation, 8 miles above its mouth. The entrance has been improved by dredging a channel 60 feet wide and 8 feet deep into the creek; 9 feet draft can be taken to **Paulsboro**, 2¾ miles above the entrance, and 6½ feet to Berkley. At Paulsboro there are two drawbridges; width of draws 35 and 40 feet. At Berkley two close bridges, which are 12 feet ab ve mean high water, cross the river.

Woodbury Creek empties into the south side of Delaware River about 1¼ miles below League Island, and south of the entrance to Schuylkill River. The deepest draft taken into the creek is about 6 feet, and this draft can be taken to the village of **Woodbury**, about 2½ miles above its mouth. There are two bridges below the village with draws 29 and 33 feet wide.

The **Schuylkill River** (see description) enters Delaware River from the northward, about 80 miles above The Capes.

To the eastward of the mouth of the Schuylkill River, on the northern side of the channel of Delaware River, is **League Island**, the site of the U. S. navy yard.

Philadelphia is on the western bank of the Delaware River about 86 miles above The Capes. The wharves of the city extend along the banks of the river for a distance of about 5½ miles.

Gloucester is a town on the eastern bank of the river about 1½ miles below Camden. The town is on a peninsula formed by the mouths of two shallow unimportant creeks. **Little Timber Creek** on the south and **Newton Creek** on the north.

Camden is a city on the east bank of the river opposite Philadelphia; the two cities are connected by several lines of ferries. Between the wharf line of the two cities the channel is being improved by dredging.

Cooper Creek empties into Delaware River on the northeastern side of the city of **Camden**, the entrance to the creek being south of Petty Island. The creek is shallow but navigable for vessels of 6 feet draft up to State Street bridge in Camden.

Petty Island, lying in the middle of the river abreast the northeastern water front of the city of Philadelphia, is irregular in shape, having a length of about 1⅝ miles and a width, at its widest part, of ½ mile. There are channels on each side of the island, but the one to the northward of it is the deeper and better and is being improved by dredging, while the channel to the southward and eastward of it is not buoyed.

A drawbridge (width of draw about 125 feet on each side of middle pier) crosses the river at the upper end of Philadelphia about 1 mile above Petty Island; this bridge is 40 feet high above high water and has spans about 540 feet long.

Between Philadelphia and Bordentown, 24 miles farther up, the river extends in a general **ENE.** direction; the channel is narrow, crooked, and only partly buoyed, and local knowledge is necessary to carry the best water through it.

Pensauken Creek empties into the eastern side of Delaware River about 2¾ miles above the northern end of Petty Island; it is a narrow, shallow stream only entered by canal boats and barges, on account of several close bridges which cross a short distance above its mouth. These bridges are 12 feet high in the clear and have spans 25 feet in length.

Frankford Creek empties into the western side of Delaware River 3 miles above the northern end of Petty Island. The creek has a narrow channel with a depth of 7 feet from its entrance to above Bridge Street bridge in **Bridesburg**, a part of the city of Philadelphia.

Rancocas Creek is fully described in another part of this volume.

About 13½ miles above Petty Island on the east bank of the Delaware River is the town of **Burlington**, and **Burlington Island** lies at the upper end of the town. Opposite Burlington Island is the town of **Bristol**, which is a terminus of the Delaware Division of the Pennsylvania Canal.

Bordentown, on the east bank of the river about 24 miles above Philadelphia, is the terminus of the **Delaware and Raritan Canal.** (See page 37.) About 7½ feet is the draft that can be taken up to the canal entrance at low water, but local knowledge is necessary to carry the best water over Kinkora Bar.

Trenton, about 28 miles above Philadelphia and 4 miles above Bordentown, is at the head of navigation. South of Trenton and separated from it by Assanpink Creek is the town of **Chambersburg**; here a bridge crosses the Delaware River. With local knowledge 9 feet can be taken up to the city of Trenton at high water.

Anchorages and Ice Harbors.—There is good anchorage anywhere in the channel of the river, except where the bottom is rocky, and vessels beating up or down, when encountering an unfavorable tide usually anchor as soon as they find they are making no progress. **Bombay Hook Roads**, the part of the river to the eastward of Bombay Hook Lighthouse, is a good anchorage and is used by deep-draft vessels while waiting for a favorable tide to pass over the shoal, off Stony Point, to the southward of Reedy Island. Vessels of deep draft entering Delawa e Bay for refuge in southeasterly gales sometimes anchor to the southward of "The Shears," but care must now be taken not to run foul of the new breakwater. (*See Supplement, Art. 18.*)

The anchorage off Philadelphia is on the eastern side of the channel abreast Camden. (See also "Extracts from the rules and regulations of the Board of Wardens" in Appendix I.)

In the winter when heavy ice is running it is dangerous to anchor anywhere in the river except at New Castle and Marcus Hook, where there are ice breakers, behind which vessels can lie in security. Or, vessels of less than 15 feet draft can anchor to the westward of Reedy Island abreast of Port Penn; the ice does not run so heavy here as in the Main Channel.

Pilots.—Pilotage is compulsory for certain vessels. (See pilot laws and regulations in Appendix I; also heading "Pilots" on page 50.)

Towboats will usually be found cruising in the river and bay waiting to be engaged. In the winter, when ice is running, it is advisable for all sailing vessels to tow.

Supplies.—Coal for large steamers can be had at Philadelphia, Camden, and Wilmington, and for small steamers and tugs at a wharf on the west bank of the river just below Wilmington and at Delaware City. Water and ship chandler's stores can be had at Philadelphia, Camden, Chester, and Wilmington, and after half-ebb tide the water in the river as far down as Chester is fresh enough for use in boilers. Provisions can be obtained at any of the towns on the river.

Repairs.—The shipyards at Philadelphia, Camden, Chester, and Wilmington have the best of facilities for the repair and construction of wood, iron, and steel vessels, and the machinery of steamships.

A time ball is dropped daily at noon of the 75th meridian (5h. 0m., Greenwich mean time) from a staff on the Merchants' Exchange, in Philadelphia. (*See Supplement, Art. 19.*)

Freshets are of rare occurrence in the river, and unless accompanied with ice do not interfere with navigation.

Ice.—In ordinary winters there is usually sufficient ice in the river to make it a source of care to sailing vessels. Thin ice has been known to form early in December between Chester and Philadelphia, but the heavier ice does not usually begin to run before January. The tidal currents keep the ice in motion, except where it packs in the narrower parts of the river, when it often forms an obstruction that requires the services of steam, and the ice boats, of which there are a number at Philadelphia, are employed in keeping these parts of the river open. The greatest danger encountered from the ice is at Ship John Shoal, just above Fort Delaware, off Deep Water Point, and at the Horseshoe; at these places the ice usually packs heavier than elsewhere. After the first of March ice is rarely met with.

In severe winters navigation above Chester has occasionally been closed, but with the powerful steamers now employed in the foreign and coasting trade to Philadelphia, the channel is kept navigable for steamers during the most severe winters. The greatest danger is to sailing vessels, which if caught in the pack ice are set on the shoals, and if in the thin ice, are liable to be cut through on the water line.

Tides.—For tidal data of Philadelphia see table on page 21. High water occurs at Bombay Hook Lighthouse 3h. 33m. before high water at Philadelphia, and low water 4h. 12m. before low water at Philadelphia. The mean rise and fall of tides is 6·1 feet. For tidal data at entrance to Christiana River, see heading Christiana River.

A description of the tidal indicator at Reedy Island is given on pages 28 and 56.

GENERAL REMARKS ON APPROACHING THE ENTRANCE TO DELAWARE BAY FROM SEAWARD.

Between the parallels of 38° 15′ N. and 39° 15′ N., the 100-fathom curve is from 75 to 90 miles offshore, and the 30-fathom curve is about 30 miles closer in toward the shore, both having a general **NE.** and **SW.** trend. Inside the 30-fathom curve the water shoals gradually to the westward to the 20-fathom curve, but inside this curve the depths are somewhat irregular, and if not sure of her position, especially in thick weather, a vessel when inside of the 20-fathom curve should approach the coast with care.

Vessels coming from southward and seaward in clear weather should shape their course so as to cross the meridian of 74° 30′ W. in latitude 38° 40′ N.; they may then stand **WNW.** for the entrance and carry a good depth of water until the land or lights are sighted. On a clear night the lights of the light-vessels or lighthouses should be made in ample time to prevent too close an approach to the shore. If not sure of the longitude, soundings should be taken frequently and the water not shoaled to less than 20 fathoms until between the parallels of 38° 40′ N. and 38° 50′ N., and the entrance approached between those parallels.

In thick weather, a vessel in doubt as to her position should keep outside of the 20-fathom curve until the weather clears, but if sure of her position she should make Five Fathom Bank Light-vessel and then stand in.

In approaching the entrance from the northward and seaward, when between the parallels of 39° 15′ N. and 38° 40′ N., soundings of 20 fathoms indicate a distance of nearly 30 miles from shore. In clear weather, a vessel standing to the westward on the parallel of 38° 47′ N. should make Five Fathom Bank Light-vessel before the depth is lessened to 15 fathoms.

On a clear night one or both of the light-vessels marking Five Fathom Bank should be made. In thick weather soundings should be taken frequently and the vessel should be kept outside of the 20-fathom curve until the weather clears; or, if sure of the position of the vessel, Five Fathom Bank Light-vessel fog signal should be made and thence a course laid for the entrance.

A vessel can not depend on getting a pilot before she is well up to the entrance between The Capes.

SAILING DIRECTIONS, DELAWARE BAY AND RIVER TO PHILADELPHIA.

Note.—Brief descriptions of most of the tributaries of Delaware Bay and River have been given, but as sailing directions of much practical value to a stranger can not be given, they are omitted. The commerce of the tributaries is carried on mostly by vessels whose masters are familiar with the localities; strangers bound into any of the tributaries may follow the sailing directions for Delaware Bay and River as far as they are of use, and then be guided by the chart or take a pilot.

The channel is variable in width and has a general depth of over 26 feet, with the exception of the six places mentioned below, where improvements have been or are being made by the Government. In December, 1897, the depths and width of the channel were:

1. Between Bombay Hook Lighthouse and Listons Point, known as Duck Creek Flats, the depth is 26 feet in a dredged channel 400 feet wide. (*See Supplement, Art. 20.*)

2. Abreast Baker Shoal, from 3¼ miles below until nearly up to Reedy Island, the depth is 26 feet, and width 300 to 500 feet. (*See Supplement, Art. 20.*)

3. Bulkhead Shoal, 2 miles above Pea Patch Island; channel 26½ feet deep and 500 to 700 feet wide. (*See Supplement, Art. 20.*)

4. Cherry Island Flats, just above the entrance to Christiana River; channel 25.2 feet deep and 265 feet wide. (*See Supplement, Art. 20.*)

5. Schooner Ledge, just below Chester; channel 24 feet deep and 330 feet wide; bottom rock. (*See Supplement, Art. 20.*)

6. Fort Mifflin Bar, 2¼ miles below League Island; channel 22.9 feet deep, minimum width 300 feet. (*See Supplement, Art. 20.*)

At these places deep-draft vessels should avail themselves of the tide, which has a mean rise and fall of 6 feet between the entrance of the river and the wharves at Philadelphia, but during strong northerly winds the high and low waters may be as much as 2 feet lower than the mean.

The following directions are good for a draft of 20 feet; vessels of greater draft should employ a pilot, as local knowledge is necessary to take a vessel through the best water in the dredged channels. (*See Supplement, Art. 20.*)

A vessel passing into the bay, and leaving Cape Henlopen 7 hours before high water at Philadelphia, if she maintains a speed of 12 knots, will cross the shoals to the southward of Reedy Island at about high water and carry high water with her over Schooner Ledge and to Philadelphia. She will also carry the flood current with her, but it will be weak after passing Fort Delaware. A vessel maintaining a 10-knot speed should leave Cape Henlopen 1 hour earlier, or, with a speed of 13 knots, ½ hour later.

The directions for daytime and night are about the same, but for greater convenience are given separately in each section.

1. ***Approaching and Entering from the Northwest.***—From Five Fathom Bank Light-vessel steer **W. ¾ N.** This course made good for nearly 21 miles will lead on to the Delaware Breakwater Range, and Cape May Lighthouse will bear **NNE. ½ E.*** Then steer **N.** by **W. ⅝ W.** about 11½ miles and pass a little less than ¾ mile to the westward of Brandywine Shoal Lighthouse. When the lighthouse bears **E.** follow the directions in section 2.

At night.—Make good a **W. ¾ N.** course from Five Fathom Bank Light-vessel, keeping in the red rays of Delaware Breakwater (east end) Light until Cape May Light bears **N.** by **E. ¼ E.** Continue the **W. ¾ N.** course, and in the white rays of Delaware Breakwater (east end) Light, until on the Delaware Breakwater Range (front light flashing white, rear light fixed white) and Cape May Light bears **NNE. ½ E.** Then steer **N.** by **W. ⅝ W.**, keeping in the white rays of Brandywine Shoal Light and taking care not to be set to the westward of the course. Pass about ¾ mile to the westward of Brandywine Shoal Light, and when it bears abeam follow the directions in section 2.

If beating in at night.—When standing to the northward, go about when Five Fathom Bank Light-vessel bears **ESE. ½ E.**, and when the breakwater Range can be seen keep to the southward of it until up to the entrance. When standing to the southwestward, go about when Cape Henlopen Light bears to the northward of **NW. ½ N.** and take care not to approach the cape too closely, on account of Hen and Chickens Shoal. After passing inside Cape Henlopen, when standing to the westward, go about as soon as Cape Henlopen Light bears **S.**, and keep in the white rays of Brandywine Shoal Light as soon as it can be seen. It is advisable for deep-draft vessels to take a towboat when near the cape, as they can not beat up the bay at night without serious danger of running on to shoals.

Remarks.—The **W. ¾ N.** course leads nearly 3 miles to the southward of McCrie Shoal; when Cape May Lighthouse bears about **N.** by **E.** a red whistling buoy should be made on the starboard bow, and when abreast of this buoy it should be nearly ⅝ mile distant on the starboard hand. The Breakwater range should be in sight, bearing about **W. ½ S.**, and be seen to close gradually as the point is approached for standing up the bay.

On the **N.** by **W. ⅝ W.** course the whistling buoy will be left nearly ⅝ mile on the starboard hand; the bell buoy marking Brown Shoal should be made and left ¾ mile on the port hand, and Brandywine Shoal Lighthouse should be made on the starboard bow. As the latter is approached Fourteen Foot Bank Lighthouse should be made on the port bow. (*See Supplement, Art. 21.*)

Dangers.—**Five-Fathom Bank** is described on page 52.

McCrie Shoal lies 5½ miles to the southward of Cape May; it has a least depth of 17 feet and is marked on its southern side by a buoy (red, No. 2½), which bears **SE. ½ S.**, distant 6½ miles, from Cape May Lighthouse. (*See Supplement, Art. 22.*)

Overfalls or **South Shoal** consists of numerous detached lumps, with from 10 to 18 feet of water over them, lying about 5 miles **SSW. ½ W.** from Cape May Lighthouse. For a distance of 2 miles to the southwestward of the shoal proper are several detached spots with depths of 18 to 20 feet over them. Two buoys (one a red whistling and the other a red spar) are placed to the southward of the latter shoal spots, on the northern side of the main channel into the bay, and bear **NE.** by **E.**, distant 4 miles, from Cape Henlopen Lighthouse.

Hen and Chickens Shoal is about 3 miles long and about ¼ mile wide at its widest part, with depths of 5½ to 17 feet over it. The northern end of the shoal is about ⅝ mile from the beach, nearly ¾ mile to the northward

* Overfalls Light-vessel, showing two fixed white lights (and with a steam whistle giving blasts of 4 seconds separated by silent intervals of 56 seconds, during thick or foggy weather), is to be moored 3⅛ miles **ENE. ⅜ E.** from Cape Henlopen Lighthouse and in the entrance to Delaware Bay. On the **W. ¾ N.** course the light-vessel should be on the port bow and should be left a little over ½ mile on the port hand. On the **N.** by **W. ⅝ W.** course, when standing up the bay, the light-vessel should be kept astern. (*See Supplement, Art. 23.*)

of Cape Henlopen Lighthouse; from here it extends in a **S.** by **E.** $\frac{3}{4}$ **E.** direction, the southern end being marked by a buoy (black, No. 1). Between this shoal and the beach is a narrow channel with depths of $3\frac{1}{2}$ to 7 fathoms.

The Shears is an extensive shoal lying to the westward of the main channel, north of Cape Henlopen and the Delaware Breakwater; its eastern end is marked by a buoy (black, No. 5) which bears **N.** by **E.** $\frac{1}{2}$ **E.** distant $1\frac{5}{8}$ miles from Delaware Breakwater (east end) Lighthouse. To the northwestward of this buoy, and extending from the southeastern point of the shoal, is the new breakwater in course of construction. (*See Supplement, Art. 24.*)

Round Shoal is on the eastern side of the Main Channel, its western edge being about 3 miles to the westward of Cape May Lighthouse. Between Round Shoal and Overfalls or South Shoal, which lies to the southward, is the Through Channel.

Brown Shoal, on the western side of the Main Channel, is about $1\frac{1}{2}$ miles long in a general **NNW.** and **SSE.** direction and about $\frac{1}{4}$ mile wide; it has a least depth of 9 feet over it, and its southern end is marked by a buoy (bell, black, No. 7), which lies **S.** $\frac{1}{2}$ **W.** distant $3\frac{3}{8}$ miles from Brandywine Shoal Lighthouse.

Brandywine Shoal is a long narrow shoal on the eastern side of the channel about 11 miles to the northward of Cape Henlopen. Brandywine Shoal Lighthouse is on this shoal, which extends about $\frac{3}{4}$ mile **SSE.** $\frac{1}{2}$ **E.** and $2\frac{1}{2}$ miles **N.** by **W.** $\frac{1}{2}$ **W.** from the lighthouse, and is marked on its southern end by red buoy No. 6, near its middle, on the channel edge, by red buoy No. 8, and at its northern end by red buoy No. 10.

1 A. ***Approaching and Entering from the Southward.***—From Fenwick Island Shoal Light-vessel make good a **N.** by **W.** $\frac{3}{8}$ **W.** course, passing 3 miles to the eastward of Cape Henlopen Lighthouse.* Continue this course up the bay, and when Brandywine Shoal Lighthouse is approached haul a little more to the westward, so as to pass $\frac{3}{4}$ mile to the westward of it. Then follow the directions in section 2.

Or, having come along shore, and when to the northward of Fenwick Island Shoal, give the beach to the southward of Cape Henlopen Lighthouse a berth of at least $1\frac{3}{4}$ miles. Bring the lighthouse to bear **W.** distant $1\frac{3}{4}$ miles and steer **N.** $\frac{3}{4}$ **W.**, and as Brandywine Shoal Lighthouse is approached shape the course so as to pass $\frac{3}{4}$ mile to the westward of it. Then follow the directions in section 2.

At night.—Follow the preceding directions, and as Brandywine Shoal Lighthouse is approached and Fourteen Foot Bank Light is made, care should be taken to enter the white rays of the latter as soon as possible by heading a little more to the northward. When in the white rays of both lights, steer so as to pass $\frac{3}{4}$ mile to the westward of Brandywine Shoal Light.

Remarks.—The **N.** by **W.** $\frac{3}{8}$ **W.** course from Fenwick Island Shoal Light-vessel leads fair into the Main Channel of Delaware Bay, leaving Cape Henlopen Lighthouse 3 miles distant when abeam. The whistling buoy and red buoy* to the southward of South Shoal will be left $1\frac{1}{4}$ miles on the starboard hand, and the black bell buoy on south end of Brown Shoal should be left $\frac{3}{4}$ mile on the port hand.

When standing to the northward along shore care should be taken to pass well to the eastward of the buoy off the south end of Hen and Chicken Shoal; after Cape Henlopen Lighthouse bears to the southward of **W.** the shore can be approached as close as $\frac{3}{4}$ mile. When standing for Brandywine Shoal Lighthouse, if Cape Henlopen Lighthouse is kept bearing **S.** or a little to the westward of **S.**, Brown Shoal will be cleared.

Dangers are described under section 1 preceding.

2. ***From Brandywine Shoal Lighthouse to Reedy Point.***—With Brandywine Shoal Lighthouse bearing **E.** distant $\frac{3}{4}$ mile, steer **NNW.**, so as to pass a little over $\frac{3}{8}$ mile to the eastward of Fourteen Foot Bank Lighthouse. When the lighthouse bears **W.**, steer **NNW.** $\frac{1}{4}$ **W.**; pass about $\frac{7}{8}$ mile to the westward of Cross Ledge Lighthouse and continue the course $4\frac{3}{8}$ miles farther, when Mahon River Lighthouse should bear **WSW.** $\frac{1}{8}$ **W.** Then make good a **NW.** by **N. Northerly** course; pass a little over $\frac{1}{2}$ mile to the westward of Ship John Shoal Lighthouse and continue the course, keeping a lookout ahead for Fort Penn Range. As soon as this range is sighted, stand on it until Reedy Island Lighthouse (on the south end of Reedy Island) bears about **N.** by **W.** and is in range with a black pyramidal tower on the main land. Steer for Reedy Island Lighthouse, keeping on the range and leaving a red buoy on the starboard hand. Then look out for the Finns Point Range (a red tower with a white dwelling attached and a brown tower showing above the trees). If this range can not be seen, continue on the Reedy Island Range until a **N.** by **E.** $\frac{1}{8}$ **E.** course will lead about 400 yards to the eastward of the pier off the eastern side

*The **N.** by **W.** $\frac{3}{8}$ **W.** course should lead for Overfalls Light-vessel, which is to be placed $3\frac{1}{8}$ miles **ENE.** $\frac{3}{8}$ **E.** from Cape Henlopen Lighthouse. See also footnote on page 61.

of Reedy Island (Reedy Island Quarantine Station). Steer **N.** by **E.** $\frac{1}{8}$ **E.** and pass 400 yards to the eastward of the Quarantine Station and as soon as the Finns Point Range is sighted stand up the river on it. When Salem Creek Lighthouse bears **ENE.** $\frac{1}{4}$ **E.** Reedy Point will be on the port beam and the New Castle Range will bear **N.** by **W.** $\frac{7}{8}$ **W.** When on the New Castle Range, proceed as directed in section 3. (*See Supplement, Arts. 25 and 26.*)

At night.—With Brandywine Shoal Light bearing **E.**, distant $\frac{3}{4}$ mile, steer **NNW.**, taking care to keep in the white rays of Brandywine Shoal, Fourteen Foot Bank, and Cross Ledge lights. When Fourteen Foot Bank Light bears **W.** and is distant about $\frac{3}{8}$ mile, steer **NNW.** $\frac{1}{4}$ **W.**, keeping in the white rays of all the channel lights and passing about $\frac{7}{8}$ mile to the westward of Cross Ledge Lighthouse; continue the **NNW.** $\frac{1}{4}$ **W.** course and cross the red sector of Mahon River Light, which will be seen to the westward. Continue 1 mile after Mahon River Light changes from red to white, and then steer **NW.** by **N. Northerly,** so as to pass about $\frac{1}{2}$ mile to the westward of Ship John Shoal Lighthouse. As soon as Port Penn Range (front light fixed white 2 seconds, eclipse 1 second; rear light fixed white) is made ahead keep close on the range, and when the vessel is on the Reedy Island Range (front light fixed white 7 seconds, eclipse 1 second; rear light fixed white), steer about **N.** by **W.**, keeping on the latter range. Having stood on the Reedy Island Range for a little over $1\frac{1}{4}$ miles the vessel should be on the Finns Point Range (front light fixed white 2 seconds, eclipse 1 second; rear light fixed white), which should bear about **N.** by **E.**; when on the latter range keep it, course **N.** by **E.** $\frac{1}{8}$ **E.**, and having stood on this course a little over 5 miles look out for the New Castle Range (front light fixed white 2 seconds, eclipse 1 second; rear light fixed white), which will be opened to the northward of Fort Delaware, bearing about **N.** by **W.** $\frac{3}{4}$ **W.**; when on this range proceed as directed in section 3.

Remarks.—On the **NNW.** course Fourteen Foot Bank Lighthouse (see table, page 14) will be on the port bow, the two buoys marking the western edge and northern end of Brandywine Shoal will be left well on the starboard hand; Cross Ledge Lighthouse should be made a little on the starboard bow, and Egg Island Lighthouse broad off the starboard bow.

On the **NNW.** $\frac{1}{4}$ **W.** course the black buoy on the lower end of Joe Flogger Shoal will be left $\frac{3}{4}$ mile on the port hand, and Miah Maull Shoal buoy nearly 1 mile on the starboard hand; the sailing line leads about $\frac{1}{2}$ mile to the eastward of the edge of Joe Flogger Shoal, nearly $\frac{1}{2}$ mile to the eastward of the Swash buoy and close to a black and white perpendicularly striped buoy. When past Cross Ledge Lighthouse a lookout should be kept for Elbow of Ledge buoy (red buoy—when not in danger from ice it is gas-lighted showing a fixed white light), which is a short distance below the red sector in Mahon River Light; this buoy should be left $\frac{1}{4}$ mile on the starboard hand, and when it is passed the buoy of the Middle (black and white perpendicular stripes) should be made ahead and left close-to on either hand. (*See Supplement, Art. 25.*)

At night, if in doubt as to whether the vessel is too much to the westward of the sailing line while in the red sector of Mahon River Light, haul a little to the northward until on the edge of the red rays of Ship John Shoal Light and keep on the edge of the red rays until Mahon River Light bears **WSW.** $\frac{1}{8}$ **W.** (nearly abeam).

On the **NW.** by **N. Northerly** course, Ship John Shoal Lighthouse will be on the starboard bow, and when it is 3 miles distant see that the black buoy on the upper end of Joe Flogger Shoal is left on the port hand. After Ship John Shoal is passed Bombay Hook Point Shoal buoy will be left nearly $\frac{1}{2}$ mile on the port hand; to the northward of this buoy is the anchorage known as **Bombay Hook Roads.** Bombay Hook Lighthouse should be 2 miles distant when abeam, and the vessel should be close to a large white and black perpendicularly striped spar buoy which marks the southern end of the new dredged channel through Duck Creek Flats. Shortly after this buoy has been passed Port Penn Range should be made ahead, and the white and black perpendicularly striped buoy, marking the northern end of the new dredged channel through Duck Creek Flats, will be left on the port hand. Reedy Island Lighthouse (see table, page 16) will be made on the starboard bow and several buoys will be passed and left as indicated by their color. Near the intersection of the Port Penn Range and the Reedy Island Range is a black spar buoy which should be left on the port hand. The red buoy seen to the southwestward of Reedy Island Lighthouse marks the end of a jetty making off to the southward from Reedy Island and is left nearly $\frac{3}{4}$ mile on the port hand. (*See Supplement, Art. 25.*)

On the **N.** by **W.** course on the Reedy Island Range the red buoy, marking the edge of Baker Shoal, is left on the starboard hand.

On the **N.** by **E.** $\frac{1}{8}$ **E.** course the shore of Reedy Island is given a berth of nearly $\frac{1}{2}$ mile. The **National Quarantine Station,** built on piling about 350 yards from the eastern shore of Reedy Island, is a conspicuous mark in this part of the river. Finns Point Range (see table, page 16) should be made ahead and kept, and the black buoy marking the edge of Reedy Island Flats be left $\frac{1}{4}$ mile on the port hand. Fort Delaware will be made broad off the port bow and the New Castle Range (see table, page 16) will be opened to the eastward of the fort; when nearly on this range Reedy Point will be on the port beam and Salem Creek Lighthouse a little forward the starboard beam. The southern entrance to the Bulkhead Shoal Channel leads close to Reedy Point. (*See Supplement, Art. 26.*)

Dangers.—**Joe Flogger Shoal,** a narrow shoal, almost bare in places at low water, is $13\frac{3}{4}$ miles long in a general **NNW.** and **SSE.** direction, lying on the west side of the Main Channel. The southern end of the shoal is $1\frac{3}{4}$

miles **NNW.** $\frac{1}{2}$ **W.** from Fourteen Foot Bank Lighthouse, and is marked by a buoy (black, No. 9); the northern end is $2\frac{1}{4}$ miles **S.** by **E.** $\frac{1}{4}$ **E.** from Ship John Shoal Lighthouse, and is marked by black buoy No. 13. To the westward of Joe Flogger Shoal is Blake Channel, which though marked by several buoys is little used.

Miah Maull Shoal has a least depth of 13 feet over it, and lies about 4 miles **SSE.** $\frac{1}{4}$ **E.** from Cross Ledge Lighthouse. Near its southwestern side is a buoy (red, No. 12). Several detached spots with 18 feet over them extend from this shoal to Cross Ledge.

Cross Ledge is one of a number of shoals which extend in a continuous line along the eastern side of the Main Channel to Salem Cove. Near the southern end of the ledge is Cross Ledge Lighthouse (see table, page 16); depths of 11 to 17 feet extend about $\frac{7}{8}$ mile to the southward of the lighthouse and from 2 to 10 feet $3\frac{1}{4}$ miles to the northward. To the westward of the ledge and on the eastern edge of the Main Channel is a buoy (red, No. 14); this buoy, when not in danger from ice, is gas-lighted, showing a fixed white light.

Ben Davis Point Shoal is on the eastern side of the Channel about midway between Cross Ledge and Ship John Shoal lighthouses; it has a least depth of 5 feet over it, and is marked at its western end by a buoy (red, No. 16).

Ship John Shoal is a cluster of lumps having a least depth of 7 to 10 feet over them. The Lighthouse is near the western edge of the shoal.

Bombay Hook Point Shoal extends about 1 mile to the eastward from Bombay Hook Point; the shoal rises abruptly from the deep water of the Main Channel and has depths of 2 to 5 feet over it; on the eastern edge of the shoal is a buoy (black, No. 15).

Arnold Point Shoal has 3 to 12 feet of water over it, and extends along the eastern side of the Main Channel east of what is known as Bombay Hook Roads. The red sector in Ship John Shoal Lighthouse covers this shoal, which is marked at its southern end by Dunckas Shoal buoy (red, No. 6) and at its northern end by red buoy, No. 18; the latter bears **E.** by **N.** from Bombay Hook Lighthouse, distant nearly $2\frac{3}{4}$ miles.

Between Arnold Point Shoal and Stony Point, on the east side of the Main Channel, the shoals make off $1\frac{1}{2}$ miles from the shore; a buoy (red, No. $18\frac{1}{2}$) marks the edge of these shoals opposite Liston Point.

The Ridge is a small shoal with 18 feet of water over it and lies in the western half of the Main Channel $3\frac{1}{4}$ miles **S.** $\frac{3}{4}$ **E.** from Reedy Island Lighthouse; off the northern end of the shoal is a buoy (black, No. 17).

The bight between Liston Point and Port Penn is full of shoals which have only 1 and 2 feet of water over them.

Stony Point Shoal and **Baker Shoal** are two long narrow shoals on the eastern side of the Main Channel just above Stony Point. Baker shoal is nearer the channel and is marked near its western side by a buoy (red, No. 20). Stony Point Shoal has 5 to 10 feet over it and lies to the eastward and parallel to Baker Shoal, being separated from the latter by a narrow channel with 13 to 18 feet of water.

Reedy Island Flats extend to the southward and northward from Reedy Island; a jetty extends to the southward from the lighthouse in the direction of the flats. To the northward of the island the flats are nearly dry at low water for a distance of $1\frac{3}{4}$ miles, there being but a narrow channel with 10 feet of water between their northern end and Reedy Point. The eastern edge of the flats is marked by a buoy (black, No. 19) abreast of Elsingboro Point.

Salem Cove is full of shoals from Elsingboro Point to Finns Point.

3. ***From Reedy Point to Chester.***—Having followed the directions in section 2 and made the New Castle Range (two white towers) stand up on the range, course **N.** by **W.** $\frac{3}{4}$ **W.**, and leave the three red buoys off Finns Point on the starboard hand. When abreast of the third red buoy (No. 26) haul a little to the northward and look out for the Deep Water Point Range (red tower with a square day mark on top, and a brown tower), which should bear about **NE.** A black spar buoy (No. 23) should be left about 200 yards on the port hand. (If the Deep Water Point Range can not be seen, steer **NE.** $\frac{1}{4}$ **E.** from black buoy No. 23 until it is made ahead.) As soon as the vessel is on the Deep Water Point Range keep it, course about **NE.** $\frac{1}{4}$ **E.**, until nearly abreast of black buoy No. 27 on New Castle Flats, and until on Cherry Island Range, which will be opened to the eastward of Christiana Beacon and Christiana Lighthouse. (If the Cherry Island Range can not be seen when the front tower of the Deep Water Point Range is $1\frac{3}{8}$ miles distant ahead, steer about **NNE.** $\frac{1}{8}$ **E.** so as to leave two long piers, which will be seen making off from the west bank, about 350 yards on the port hand.) If at all clear, Cherry Island Range (two white towers, a large flagstaff just to the left of the front tower) should be seen when abreast of either of the piers. (*See Supplement, Art. 27.*)

Follow Cherry Island Range, course about **NNE.** $\frac{1}{8}$ **E.**; leave the red and black horizontally striped buoy on the starboard hand and continue close on the range until the front tower of the range is distant about $\frac{5}{8}$ mile, and red buoy No. 28 is 50 yards distant on the starboard beam. Then steer about **NE.** $\frac{1}{4}$ **N.** and follow the western bank of the river, giving it a berth of 500 to 600 yards, leaving the red buoys on the starboard hand. When

abreast the State Quarantine Station at Marcus Hook get on the Schooner Ledge Range (square red tower on white dwelling and brown tower showing above trees), which should be ahead bearing about **NE.** by **E.** $\frac{1}{2}$ **E.**, and keep close on the range until past Schooner Ledge; the sailing line leads 350 yards from the wharves at Chester. When nearly abreast of the north end of Chester Island look out for the Tinicum Island Range (detached, square, open framework tower and brown tower with black staff and disk showing above trees), which should bear about **E.** $\frac{5}{8}$ **S.**, and when on the range follow the directions in section 4.

At night.—Having followed the directions in section 2 until on the New Castle Range (front light fixed white 2 seconds, eclipse 1 second; rear light fixed white), stand up on the range, course **N.** by **W.** $\frac{3}{4}$ **W.**, and pass into the red rays of the rear light of the Finns Point Range, which will be a little abaft the starboard beam. After the vessel has stood in these red rays a little over $\frac{1}{4}$ mile, and the gas-lighted buoy on Goose Island Flats is on the starboard beam (still being on the New Castle Range), haul gradually to the northward about 2 points and draw on to the Deep Water Point Range (front light fixed white 2 seconds, eclipse 1 second; rear light fixed white), which should be steered for, course about **NE.** $\frac{1}{4}$ **E.**

Having stood on the Deep Water Point Range about 3 miles, look out for the Cherry Island Range (front light fixed white 2 seconds, eclipse 1 second; rear light fixed white), which will be seen to the right, above the beacon light and lighthouse at Christiana River. When on Cherry Island Range, the white beacon light at Christiana River will show well to the westward. Stand on the Cherry Island Range, course **NNE.** $\frac{1}{8}$ **E.** (deep draft vessels should keep close on this range), until the front light of the range is a little over $\frac{1}{2}$ mile distant ahead and the dock of the Edgemoor Rolling Mill is on the port beam. Then steer **NE.** $\frac{1}{4}$ **N.**, giving the west bank of the river a berth of 600 yards; after having stood on this course for 2 miles the edge of the red sector in the front light of the Cherry Island Range may be followed until the vessel is on the Schooner Ledge Range. (*See Supplement, Art. 27.*)

Having stood on the **NE.** $\frac{1}{4}$ **N.** course nearly 3 miles, a sharp lookout should be kept for the Schooner Ledge Range (front light fixed white 2 seconds, eclipse 1 second; rear light fixed white), which should be made bearing about **NE.** by **E.** $\frac{1}{2}$ **E.** If this range can not be distinguished, follow the west bank of the river, giving it a berth of 600 yards, until the range is picked up, when the vessel should be brought on the range and kept close on it until Schooner Ledge is passed. Continue on the range, and when near the northern end of Chester Island look out for the lights of Tinicum Island Range (front light fixed white 2 seconds, eclipse 1 second; and rear light fixed red), which, when in range, should bear **E.** $\frac{5}{8}$ **S.** When on this range follow the directions in section 4. (*See Supplement, Art. 28.*)

Remarks.—On the **N.** by **W.** $\frac{3}{4}$ **W.** course, the southeastern end of Pea Patch Island is left about 350 yards on the port hand; a number of red buoys marking the eastern edge of the channel will be left on the starboard hand and the black buoys on the edge of Bulkhead Shoal on the port hand.

On the **NE.** $\frac{1}{4}$ **E.** course the curved jetty extending out from Penns Neck will be left on the starboard hand; the town of New Castle will be seen on the port hand, and the piers of the ice harbor will show outside the wharves. The village of Pennsville will be on the starboard hand when the course is changed to stand on the Cherry Island Range.

On the **NNE.** $\frac{1}{4}$ **E.** course Deep Water Point is left nearly $\frac{1}{2}$ mile on the starboard hand a short time before Christiana River (Wilmington Harbor) is opened out. Opposite Deep Water Point, on the west bank of the river, are two long piers, the upper one being a coal pier for coaling steamers and tugs. From the time Deep Water Point has been passed care should be taken by deep-draft vessels to keep close on the range while passing through the dredged channel. When the dock of the Edgemoor Rolling Mill (large brick buildings with tall brick chimney) is on the port beam, the buoy (red, No. 28) marking the upper end of the dredged channel will be on the starboard beam distant about 50 yards.

On the **NE.** $\frac{1}{4}$ **N.** course several buoys will be left on the starboard hand. If desirable the west bank of the river can be followed, giving it a berth of 600 yards, until abreast the Quarantine Station at Marcus Hook, above this the Schooner Ledge Range should be closely followed and the red and black horizontally striped buoys left on the starboard hand and one black buoy left on the port hand. The city of Chester will be on the port hand and Chester Island (low and marshy) will be on the starboard bow. The sailing line passes about midway between the island and west bank of the river.

Dangers.—**Pea Patch Shoal,** with a depth of 1 to 16 feet, extends $1\frac{1}{2}$ miles to the southward from the island and is marked near the eastern side of its southern point by a buoy (red and black horizontal stripes).

Bulkhead Shoal makes off to the northward from Pea Patch Island for a distance of $2\frac{1}{2}$ miles. A part of this shoal is nearly bare at low water, and its eastern edge is marked by three black buoys and one red and black horizontally striped buoy. (*See Supplement, Art 30.*)

Goose Island Flats make off from the east bank of the river at Penns Neck and have depths of 3 to 8 feet close to the edge of the channel. Along the edge of the channel and marking the flats are five red buoys, the third buoy from the southward being a gas-lighted buoy showing a fixed white light.

New Castle Flats make off from the western bank of the river between the town of New Castle and Christiana River. The eastern edge of the flats is marked by a buoy (black, No. 27).

Cherry Island Flats show partly bare at low water, and are in the middle of the river a short distance above the entrance to Christiana River; there is a buoyed channel to the eastward and westward of the flats; the western channel, which is the narrower and deeper, has been dredged through a 15-foot shoal which formerly extended from the flats to the mouth of Christiana River.

Seventeen Foot Knoll lies in the middle of the river nearly 2¼ miles above the rear lighthouse of the Cherry Island Range. It is, properly speaking, an extension of the Marcus Hook Bar; the latter is nearly bare in places at low water, and extends along the eastern side of the Main Channel to Raccoon Island, opposite the city of Chester. A red buoy (No. 34) is placed to mark the shoal, and is in the middle of the river about 2¾ miles above the front light of the Cherry Island Range.

Marcus Hook Bar is in mid-river and extends down stream from abreast the lower end of the city of Chester to 2½ miles below the State Quarantine Station at Marcus Hook. The bar is on the east side of the main channel and is nearly bare in spots at low water. On its western side, and about 1 mile above Seventeen Foot Knoll buoy, it is marked by a buoy (red, No. 36).

Schooner Ledge has depths of 18 feet over it and lies abreast the lower wharf at Chester. A channel 24 feet deep and 330 feet wide has been cut between the ledge and the west bank to permit the passage of deep draft vessels on the range. Two red and black horizontally striped buoys are placed to mark the limits of the ledge and a black buoy marks the western edge of the channel.

Chester Island Flats extend a little over 1 mile to the southwestward from Chester Island, and near the Island are nearly bare at low water. On the northern side of the flats near their western end is a buoy (red, No. 38).

4. ***From Chester Island to Philadelphia.***—Having followed the directions in section 3, and the vessel is on the Tinicum Range, keep the range, course about **E. ⅝ S.**, until the rear tower of the Fort Mifflin Bar Range (detached, pyramidal white tower) bears two points forward of the starboard beam, then change the course to **ENE. ½ E.** and continue on this course until on Fort Mifflin Range. (The front tower of Tinicum Island Range is also the front tower of Fort Mifflin Range.) Keep Fort Mifflin Range over the stern, course **NE.** by **E. ⅜ E.**, and leave the red buoys on the starboard hand. Look out for the Horseshoe Lower Range (West Group), which is on the western side of the entrance to Schuylkill River.

When the small white structure (front range light) is on with the rear tower of the Horseshoe Lower Range keep them in range over the stern, course **E.** by **S.** When near the eastern end of League Island look out for the range on the starboard hand, and when the small red structure is in range with the white rear tower change the course, hauling to the northward, taking care to leave Horseshoe buoy (black, No. 37) on the port hand. Shortly after passing this buoy the two white structures of the Horseshoe Upper Range (East Group) should be in range over the stern and be kept there, course **NNE. ¾ E.** From abreast the town of Gloucester, follow a mid-river course and anchor abreast Philadelphia within the limits prescribed by the rules and regulations for the port (see Appendix I).

At night.—Having followed the directions in section 3 and being on the Tinicum Island Range (front light fixed white 2 seconds, eclipse 1 second; rear light fixed red), stand on this range 3½ miles, course **E. ⅝ S.**, when the rear range light of the Fort Mifflin Range should be visible bearing about 2 points forward the starboard beam. Then change the course to **ENE. ½ E.**, and when on the Fort Mifflin Range (front light fixed white 2 seconds, eclipse 1 second; rear light fixed red) steer **NE.** by **E. ⅜ E.**, keeping the range close.

As the entrance to Schuylkill River is approached look out for the Horseshoe Lower Range (two fixed white lights) which is on the west bank of the entrance to Schuylkill River. When on this range steer **E.** by **S.**, keeping the range over the stern and look out for a range which will be opened on the starboard hand (front light fixed red, rear light fixed white). When on this range haul gradually to the northward, course about **ENE.**, and keep a lookout for the Horseshoe Upper Range (the rear light for the turning range is also the rear light for the Horseshoe Upper Range). When on the Horseshoe Upper Range (two fixed white lights), steer **NNE. ¾ E.**, keeping the range over the stern, and when nearly up to the Pennsylvania R. R. wharves stand over toward the western shore and follow the wharf line, giving it a berth of about 150 yards.

Remarks.—The **E. ¾ S.** course leads to the southward of Tinicum Island, a low flat marsh, and directly for the east bank of the river, which should be given a berth of 250 yards when the course is changed to get on the Fort Mifflin Range.

On the **ENE. ½ E.** course a black buoy will be made on the port bow and the front tower, which is the same for both the Tinicum Island and Fort Mifflin ranges, will be left nearly 400 yards on the starboard hand.

On the **NE. by E. ¾ E.** course the buildings on League Island will be ahead, and as the island is approached the entrance of Schuylkill River will be opened out. There are extensive shoals to the southward of the sailing line. A pier on the shoal in the middle of the river and a red buoy will be left on the starboard hand.

The **E. by S.** course leads well to the southward of League Island; the town of Gloucester will be broad off the port bow. A red buoy will be made on the starboard bow, and should be left about 100 yards on the starboard hand shortly before the course is changed to round Horseshoe Shoal. While rounding this shoal leave the black buoy about 150 yards on the port hand.

When standing on the **NNE. ¾ E.** course the town of Gloucester is on the starboard bow, and the Pennsylvania R. R. wharves on the port bow. When standing up the river above the Pennsylvania R. R. wharves a number of white anchorage buoys will be seen lying in mid-stream between Philadelphia and Camden.

Dangers.—**Tinicum Island** is low and marshy and lies nearly in the middle of the river above Chester Island. The shoal making off to the westward from the island is marked at its end by a red and black horizontally striped buoy and on its southern edge by black buoy No. 33. The red buoy to the southward of the latter marks the eastern end of Chester Island Flats and the channel leads fair between the two buoys.

Fort Mifflin Bar is the name of the shoal which extends across the river about 1⅞ miles below the western point, at the entrance to Schuylkill River. This bar has been improved by dredging a channel 23 feet deep across it. A black buoy (No. 35) marks the western edge of the channel and a red buoy (No. 42) its eastern edge.

Extensive Shoals, with 2 to 8 feet of water over them, extend along the southern side of the channel ½ mile from the shore, from Fort Mifflin Bar to abreast the western end of League Island, where the shoal is known as The Elbow, and is marked at its northern edge by a buoy (red, No. 44). A channel with about 14 feet of water leads to the southward of this shoal from Fort Mifflin Bar to the village of Red Bank, opposite League Island.

Horseshoe Shoal is to the southeastward of the eastern end of League Island; it shows several bare spots at low water and is marked at its southeastern side by a buoy (black, No. 37).

The bight between Red Bank and Gloucester is full of shoals, leaving the channel in this part of the river about 350 yards wide; the northern edge of these shoals is marked by a buoy (red, No. 46).

Seventeen-foot Ridge and **Kaighn Point Flats** have been removed by dredging.

(*See Supplement, Art. 31.*)

DELAWARE BREAKWATER HARBOR.*

Delaware Breakwater Harbor is the most important artificial harbor of refuge on the Atlantic coast of the United States, being the only sheltered anchorage available for vessels of over 10 feet draft, in easterly gales, between Sandy Hook and Chesapeake Bay; it is the refuge of the large fleets of coasting vessels bound up and down the coast. The harbor is formed by the pitch of Cape Henlopen and the shore to the southwestward, and by a breakwater, which extends about ⅓ mile in a general **WNW.** direction, its eastern end (marked by Delaware Breakwater, east end lighthouse) being **WNW. ¾ W.**, distant a little over ½ mile, from the pitch of Cape Henlopen.

The depths in the harbor range from 13 to 20 feet, but there are several spots with 10 to 12 feet over them; the best depths are just inside and close to the eastern and western ends of the breakwater. A good anchorage in about 4 fathoms of water will be found about 400 yards to the southeastward of the lighthouse on the east end of the breakwater; this anchorage is sheltered from southerly and southeasterly winds, but is exposed to winds from **E.**, **NE.**, and **N.** Between the eastern end of the breakwater and the shore to the southeastward is an available entrance nearly ⅜ mile wide; the western approach to the harbor is around the western end of the breakwater. The 12-foot curve extends ¼ mile from the south shore to the harbor; there are three fish factory wharves which have a depth of about 9 feet at their ends; the long iron pier, belonging to the Government, has a depth of about 17 feet at its end. A small wharf with a depth of 3 feet at its end lies 1 mile to the westward of the fish factory wharves and is used for a boat landing. The town of Lewes is about ½ mile inland from the westernmost of the wharves.

Assisted by the lighthouses and ranges a stranger should have no difficulty in entering the harbor, either in the daytime or at night. Caution is often necessary, when coming to anchor at night, on account of the large number of vessels which, in easterly gales, will usually be crowded behind the breakwater.

For tides see table on page 21.

* Shown on charts **124**, scale $\frac{1}{80,000}$, price $0.50; **379**, scale $\frac{1}{20,000}$, price $0.25.

SAILING DIRECTIONS TO AN ANCHORAGE IN DELAWARE BREAKWATER HARBOR.

Vessels between 12 and 14 feet draft should anchor close under the eastern or western ends of the breakwater, giving it a berth of at least 75 yards. Vessels of 12 feet or less draft can anchor almost anywhere to the southward of the breakwater if the shore be given a berth of $\frac{1}{4}$ mile or more, but of course the best shelter from northerly and northeasterly winds is found close in behind the breakwater. Vessels between 14 and 16 feet draft will find shelter from **E.**, **SE**, or southerly winds to the westward of the western end of the breakwater in about 17 feet of water, soft bottom.

1. *To Enter around the Eastern End of the Breakwater.*—Directions for entering Delaware Bay from seaward are given in sections 1 and 1A, pages 61, 62.

When well in the entrance of the bay, bring Delaware Breakwater (east end) Lighthouse to bear **W.** by **S.** and steer for it. When nearly up to the lighthouse edge a little to the southward so as to give it a berth of about 100 yards, and as it is passed haul to the northward and anchor close under the eastern portion of the breakwater.

If coming down Delaware Bay, follow the main channel until about 2 miles below Brandywine Shoal Lighthouse, then bring Cape Henlopen Lighthouse to bear **S.** $\frac{1}{8}$ **E.** and steer for it. When Delaware Breakwater (east end) Lighthouse bears **SSW.** $\frac{1}{4}$ **W.** steer for it, pass about 100 yards to the eastward of it and anchor close in behind the eastern end of the breakwater. (*See Supplement, Art. 32.*)

At night.—If coming from the eastward, stand into the bay on the Delaware Breakwater Range until the red rays of Cape Henlopen Light are entered, then steer for Delaware Breakwater (east end) Light, pass about 100 yards to the eastward of it and anchor close in behind the eastern end of the breakwater.

If coming down the bay, when below Brandywine Shoal Light get on the edge of the red rays of Cape Henlopen Light, and keep on it until the Delaware Breakwater Rear Range Light can be seen; then steer for Delaware Breakwater (east end) Light (course about **SSW.** $\frac{1}{4}$ **W.**), pass about 100 yards to the eastward of it, haul sharply to the westward and anchor close in behind the eastern end of the breakwater. (*See Supplement, Art. 32.*)

Remarks and **Dangers**, see under sections 1 and 1 A, pages 61, 62.

Delaware Breakwater Range.—The front light is the westernmost of the two lighthouses on the breakwater (white structure). The rear light of the range is a brown skeleton tower nearly $\frac{3}{8}$ mile back from the beach and about 3 miles **W.** $\frac{1}{2}$ **S.** from the front range light. For characteristics of the lights, see table, page 14.

There is a small 16-foot spot lying about 225 yards **SW.** by **S.** from Delaware Breakwater (east end) Lighthouse and heavy-draft vessels should take care to avoid it.

1 A. *To Enter around the Western End of the Breakwater.*—Directions for entering Delaware Bay are given in sections 1 and 1 A, pages 61, 62.

Stand in on the Delaware Breakwater Range until Cape Henlopen Lighthouse and beacon come in range, then steer **W.** by **N.**, and when Delaware Breakwater (front range) Lighthouse comes in range with Cape Henlopen Lighthouse change the course to **SW.** by **W.** $\frac{1}{4}$ **W.** As soon as the western end of the breakwater is opened to the northward of Delaware Breakwater (front range) Lighthouse, haul sharply to the southward and eastward and anchor close in behind the western end of the breakwater, which is marked by a post-light showing a red light at night.

If coming down the bay, when about 2 miles below Brandywine Shoal Lighthouse, bring Cape Henlopen Lighthouse to bear **S.** $\frac{1}{8}$ **E.** and steer for it. Look out for black buoy No. 5, which will be left about 325 yards on the starboard hand, and when about $\frac{1}{2}$ mile past it make good a **WSW.** $\frac{1}{2}$ **W.** course, heading for the rear lighthouse of the Delaware Breakwater Range. Pass about 300 yards to the northwestward of the red and black horizontally striped buoy (marking an 18-foot spot) a little over $\frac{3}{8}$ mile to the northward of Delaware Breakwater (front range) Lighthouse, and continue the course until the front lighthouse of the Breakwater Range is abeam, then haul to the southward, round the western end of the breakwater, and anchor in 14 to 15 feet of water behind its western end. (*See Supplement, Art. 33.*)

At night.—Stand in on the Delaware Breakwater Range until the red rays of Cape Henlopen Light are entered, then make good a **W.** by **N.** course, until Delaware Breakwater (front range) Light is in range with Cape Henlopen Light; the course should then be

change to **SW.** by **W.** $\frac{1}{4}$ **W.**, and continued until the red rays of Delaware Breakwater (east end) Light are entered, then haul in and anchor behind the western end of the breakwater, which is marked by a post-light showing a red light at night.

If coming down the bay, after passing Brandywine Shoal Light get on the edge of the red and white rays of Cape Henlopen Light, and follow it until the white rays of Delaware Breakwater (rear range) Light are entered, when the rear light bears **WSW.** $\frac{1}{2}$ **W.**, steer for it, and when the front light of the Delaware Breakwater Range bears abeam, steer **SW.** until the red rays of Delaware Breakwater (east end) Light are entered, when haul to the southward and eastward and anchor close in behind the breakwater. (*See Supplement, Arts. 33 and 34.*)

Remarks.—It should be remembered that a new breakwater is being built on the southeast point of "The Shears," and vessels coming down the bay and bound into Delaware Breakwater Harbor should give "The Shears," a good berth, and at night take care not to mistake the lights which are shown (when possible) on the ends of the new breakwater.

Dangers.—The dangers in entering the bay are described under sections 1 and 1 A, pages 61, 62.

The principal dangers to be guarded against in entering the harbor around the western end of the breakwater are the following:

An 18-foot spot lying about 385 yards **N.** by **E.** $\frac{1}{2}$ **E.** from Delaware Breakwater (front range) Lighthouse.

An 18-foot spot lying 800 yards **N.** $\frac{3}{4}$ **E.** from Delaware Breakwater (front range) Lighthouse This spot is marked by a buoy (red and black horizontal stripes).

A 16-foot spot lying 100 yards in a northwesterly direction from the western end of the breakwater.

MAURICE RIVER*

empties into the northern part of Delaware Bay $4\frac{3}{4}$ miles **ENE.** $\frac{1}{2}$ **E.** from Egg Island Lighthouse. Maurice River Lighthouse is on the point to the southeastward of the entrance and is the principal guide for approaching from the bay. Extensive shoals with depths of less than 6 feet over them make off about 2 miles to the southward from the entrance, forming a bar over which the best depth is about 4 feet at low water in a channel marked by buoys. The river is narrow and very crooked, but is navigable for a distance of 21 miles above its mouth. It is mostly frequented by oystermen. About 9 feet is the greatest draft entering the river, and this draft can be taken up to Millville at high water. The channel for a distance of 4 miles below Millville has been improved by the U. S. Government and is now good for a depth of 6 feet at low water, and below this the natural river channel has a depth of about 9 feet.

Port Norris is a village near the west bank of the river about $2\frac{3}{4}$ miles above its mouth, and is an important oyster-shipping point. About 4 miles farther up the river on the east bank is the village of **Leesburg**, and $3\frac{1}{2}$ miles above the latter, on the west bank, is the village of **Mauricetown**; here a bridge crosses the river; width of draw, about 30 feet. About 21 miles above the mouth of the river, on the east bank, is the city of **Millville**; a number of large coasting vessels are owned here, and vessels of as much as 800 tons register are built at the shipyards. A towboat is also owned here for use on the river.

Maurice River is so crooked and narrow in many places that strangers should either employ a pilot or take a towboat if bound above Port Norris. Sailing vessels, if not being towed, usually take advantage of the tidal currents in sailing up and down the river.

Supplies can be had at Port Norris and Millville, and fresh water can be had at the wharf at Port Norris or taken out of the river above Mauricetown.

Tides.—For tidal data of Philadelphia, see table on page 21. High water occurs at Maurice River entrance 4h. 21m. before high water at Philadelphia, and low water 4h. 58m. before low water at Philadelphia. The mean rise and fall of tides is 5 6 feet at the entrance and about 1 foot less at Millville; it is high water at the latter place $2\frac{1}{2}$ hours later than at the mouth of the river. The tidal currents change at entrance 1 hour, and at Mauricetown $\frac{1}{2}$ hour after high and low waters. At Millville the flood current changes to ebb a little before high-water stand, and the ebb changes to flood about $\frac{3}{4}$ hour after low-water stand; this applies to the river in summer, when there are no freshets.

SAILING DIRECTIONS, MAURICE RIVER.

1. *Approaching and Entering from Delaware Bay Entrance.*—Having entered the bay, shape a course so as to pass about 2 miles to the eastward of Brandywine Shoal Lighthouse. When the lighthouse bears **W.**, steer **N.** $\frac{1}{2}$ **E.** for a distance of $8\frac{3}{4}$ miles, and then steer **NE.** $\frac{3}{4}$ **N.** for Maurice River Lighthouse until up to red buoy No. 2. From

* Shown in part on chart **124**, scale $\frac{1}{80,000}$, price $0.50.

this buoy a **N.** course will lead across the bar and into the deep water of the river channel, where a mid-river course should be followed to the wharves at Port Norris.

Remarks.—When about 2 miles to the eastward of Brandywine Shoal Lighthouse a white and black perpendicularly striped buoy should be close aboard. The **N.** $\frac{1}{2}$ **E.** course leads well to the westward of Dead Mans Shoal, and leaves the buoy marking the northern end of that shoal about 2 miles on the starboard hand.

As Maurice River Lighthouse approaches the **NE.** $\frac{1}{4}$ **N.** bearing the water will shoal to about 11 feet, and a vessel of over 6 feet of draft should not proceed farther unless on a rising tide. When standing into the river across the bar it should be remembered that the low-water depth is only about 4 feet. The numerous oyster stakes off the entrance may be confusing to a stranger and should not be mistaken for the buoys, which can usually be recognized by their color.

1A. *Approaching and Entering from Delaware River.*—Having come down Delaware River in the Main Channel, leave Cross Ledge Lighthouse on the port hand and continue down the bay until Miah Maull Shoal buoy (red, No. 12) is on the port beam. Pass close to the southward of this buoy, steering **E.** by **S.** about $4\frac{1}{4}$ miles, and then steer **NE.** $\frac{3}{4}$ **N.** for Maurice River Lighthouse.

When up to red buoy No. 2, off the entrance to Maurice River, follow the directions in section 1 preceding.

Notice also the remarks under section 1 for crossing the bar and approaching the entrance to Maurice River.

COHANSEY CREEK*

empties into Delaware River from the northeastward about $2\frac{1}{2}$ miles **NE.** from Ship John Shoal Lighthouse. The creek is very crooked and narrow in places but is navigable for vessels of 8 feet draft, at high water, as far as the city of **Bridgetown**, about 17 miles above its mouth. The entrance, which is marked on its western side by Cohansey Lighthouse (see table, page 16), is obstructed by a bar of soft mud, which has a depth of 6 feet in the channel. Strangers entering the creek usually take a local pilot or towboat; with a towboat, a draft of about 12 feet can enter this creek at high water

Bridgetown is a manufacturing city at the head of navigation; it has a shipyard with a small marine railway capable of hauling out vessels of the size trading in the creek. A towboat can be had here to tow vessels up or down the creek.

Greenwich is a village about 5 miles above the entrance and has considerable trade in produce during the season.

GENERAL DIRECTIONS, APPROACHING COHANSEY CREEK ENTRANCE.

These directions are good for vessels of 8 feet or less draft.

1. *From the Southward.*—Follow the directions in sections 1 and 2 for Delaware Bay and River until about 6 miles above Cross Ledge Lighthouse, and until abreast Ben Davis Point Shoal buoy (red, No. 16). Pass close to the westward of this buoy and make good a **N.** $\frac{3}{4}$ **W.** course for nearly $4\frac{1}{2}$ miles, or until Ship John Shoal Lighthouse bears **WSW.** (Cohansey Lighthouse bearing **NW.** by **N.**), when anchor in 9 to 15 feet of water and await a pilot or towboat.

1A. *From the Northward.*—Keep in the main channel of the Delaware River until Cohansey Lighthouse bears **E.** $\frac{3}{4}$ **S.**, when steer for it on that bearing. Pass close to the southward of red buoy No. 6 at the southern end of Arnold Point Shoal, and continue on the course until red buoy No. 4 is about 300 yards on the port bow, then steer **ESE.** until Cohansey Lighthouse bears **N.**, distant about $\frac{3}{8}$ mile, when anchor in 8 to 19 feet of water and await a pilot or towboat.

Vessels of over 5 feet draft must enter the creek near high water.

SALEM CREEK*

empties into Salem Cove from the eastward abreast of Reedy Point and about 3 miles below Fort Delaware. The creek takes its rise at Newkirk, N. J., and follows a winding course for about 30 miles to its mouth. About 14 miles above its mouth a dam has been constructed across the creek and a canal cut to the Delaware River just below Deep Water Point. This canal and the creek above the dam were the approaches to Courses Landing, but the canal is not used by vessels at the present time.

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* The entrance is shown on chart **125**, scale $\frac{1}{80,000}$, price $0.50.

The entrance to Salem Creek is obstructed by flats and shoals, through which a depth of about 5½ feet only can be taken at low water. A lighthouse is placed on the shoal just at the entrance to the creek and is the principal guide for vessels entering either in the daytime or at night. The town of **Salem**, 2½ miles above the mouth of the creek, can be reached at high water by vessels of about 9 feet draft, and there is a depth of 7 feet at low water alongside the wharves. A bridge crosses the creek at Salem; width of draw 40 feet.

Strangers are advised not to enter the creek without a local pilot or towboat. The mean rise and fall of tides is about 6 feet.

SAILING DIRECTIONS, SALEM CREEK.

The following directions are good for a draft of 5 feet, in the daytime with clear weather. Vessels of deeper draft should not enter without a local pilot.

Approaching and Entering.—When in the Main Channel of Delaware River and about 1¾ miles to the northward of the Quarantine Station at Reedy Island, bring Salem Creek Lighthouse to bear **NE. ⅞ N.** and steer for the lighthouse on this bearing, taking care not to be set to the westward. When the lighthouse is about 260 yards distant ahead, haul to the eastward a little (leaving the lighthouse on the port hand), and so as to bring the lighthouse on a **WNW. ⅞ W.** bearing when it is about 260 yards distant. Then steer **ESE. ⅞ E.** for the entrance, keeping the lighthouse astern. When in the entrance follow a mid-channel course until about 300 yards below the lower wharf at Salem, then follow the north shore of the creek (to avoid a middle-ground). Pass through the drawbridge and haul over for the wharves on the starboard hand.

Remarks.—There are several sharp bends in the creek below Salem, and a fair wind is necessary for a sailing vessel. If possible a rising tide should be selected when entering.

CHRISTIANA RIVER, OR WILMINGTON HARBOR,*

is 64 miles above The Capes and 25½ miles below Philadelphia; the entrance, in the west bank of Delaware River, a little over 4 miles above the town of New Castle, is marked on its northern side by Christiana Lighthouse, and the end of the jetty, which extends off from the northern side of the entrance, is marked by a lighted beacon.

The city of **Wilmington** is at the junction of Christiana River and **Brandywine Creek**, and about 1½ miles above the entrance of the former. It is an important manufacturing city with extensive machine shops and shipyards.

Christiana River can be entered at high water by vessels of 17 feet draft, and this can be taken to above Third Street bridge. Improvements by the Government are in progress to obtain a channel 150 feet wide and 15 feet deep at low water. Six bridges cross the river between its mouth and the upper part of the city; the widths of the draws in these bridges range from 65 to 100 feet. There is no anchorage in the river; all vessels make fast to wharves. Few vessels enter Brandywine Creek, and they are usually of less than 9 feet draft.

Nearly all sailing vessels entering Christiana River employ a towboat, on account of the narrow channel and the drawbridges. Towboats will frequently be met in Delaware River, or may be obtained at the mouth of Christiana River by making signal.

Tides.—For tidal data for Philadelphia, see table on page 21. High water occurs at Christiana River entrance 1h. 45m. before high water at Philadelphia, and low water 1h. 59m. before low water at Philadelphia. The mean rise and fall of tides is 6.3 feet.

SCHUYLKILL RIVER†

empties into Delaware River from the northward 84 miles above The Capes, and just to the westward of the U. S. Navy-yard at League Island. Flowing through and separating the eastern from the western parts of Philadelphia, it forms an important outlet for a large part of the commerce of the city. The river is navigable for large vessels for a distance of about 6½ miles above its mouth, to Chestnut Street bridge, and about ⅞ mile farther, up to Fairmount Dam, for small vessels.

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*The entrance is shown on chart **126**, scale $\frac{1}{80,000}$, price $0.50.

†Shown on charts **126**, scale $\frac{1}{80,000}$, price $0.50; **381**, scale $\frac{1}{9,600}$, price $0.50.

The river is narrow and crooked, and for a distance of about 4½ miles above its mouth leads through low marsh on either side; docks have been built for vessels to load and discharge cargoes. Between its mouth and Chestnut Street bridge the river is crossed by five drawbridges; these and the sharp bends in the river make it necessary for sailing and large vessels to employ towboats when inward or outward bound.

The river channel is narrow and is being improved by the U. S. Government, the object being to obtain a channel 400 feet wide and 24 feet deep across the bar at the entrance and up to the elevators at Girard Point, a distance of ⅞ mile; thence to Gibson Point, about 3¼ miles farther up, the channel is to be 250 feet wide and 20 feet deep, and to Chestnut Street bridge, 18 feet deep.

At present the depths and widths of the channel at mean low water are as follows: Across the bar at the mouth of the river, 24 feet deep and 125 feet wide; thence to a point ½ mile above Penrose Ferry bridge, 22 feet deep and 250 feet wide; thence to Gibson Point, 20 feet deep and 100 to 200 feet wide; thence to Chestnut Street bridge, 18 feet deep and of navigable width.

Some of the deepest draft vessels entering Delaware River load at the grain and oil docks in Schuylkill River, the former being located at Girard Point and the latter at Point Breeze and Gibson Point. No bridges are passed until above Girard Point, and only one bridge (Penrose Ferry bridge) is passed by vessels bound to the oil docks.

On the eastern side of the entrance are the range lights for entering, but strangers should not attempt to enter the river at night. In the daytime, and at low water, the channel is clearly defined by the marsh and dikes on either side.

RANCOCAS CREEK*

empties into Delaware River from the eastward, about 10½ miles above Market Street wharf, in Philadelphia. The village of **Delanco** is on the north side of the entrance and Riverside on the south side. The channel into the creek has a depth of about 8 feet, and there is a greater depth inside up to **Bridgeboro**, above which there are a number of shoal places which have been improved by the Government, with the result that there is now a channel 100 feet wide and 6 feet deep up to Centerton, and thence to Mount Holly about 25 feet wide and 4 feet deep.

Just inside the mouth of the creek it is crossed by two bridges, one with draw 45 feet and the other with draw 30 feet wide. At Bridgeboro, which is 2 miles above the entrance, there is a bridge with draw, 30 feet wide, and at **Centerton**, 5½ miles above the entrance, there is also a bridge with a draw 30 feet wide. **Mount Holly** is a town at the head of navigation, 10½ miles above the mouth of the creek; a draft of about 4½ feet can be taken up to the town.

The mean rise and fall of tides is nearly 6 feet at the entrance, about 4 feet at Centerton, and about 1.25 feet at Mount Holly.

Strangers bound in to the creek should take a local pilot or a towboat.

COAST FROM CAPE HENLOPEN TO CAPE CHARLES.†

The distance from Cape Henlopen to Cape Charles is about 114 miles, from Cape Henlopen Lighthouse to Cape Charles Lighthouse about 111 miles, and the distance on the sailing lines from Cape Henlopen to Cape Charles Light-vessel varies, according to the track followed, from 108¾ to 117½ miles. The shore is generally low and has no marked natural features readily recognized by a stranger while standing along the coast. Lighthouses and light-vessels are the principal aids, but when passing close alongshore the life-saving stations can be seen. The beach is generally low and sandy, broken in places by shallow inlets whose entrances are obstructed by bars; these inlets can only be entered by vessels of a limited draft, and are not available as harbors of refuge in easterly gales when the bars are covered with breakers.

A short distance back of the beach and connected with the inlets are a number of large shallow bays, which are navigable only for light-draft craft. These bays are connected by narrow creeks and estuaries, which together form an inland waterway for boats from Fenwick Island to Cape Charles. A canal navigable for small craft has been dredged from Assawoman Bay, near Fenwick Island, to Indian River Bay, and it is proposed to extend the inland water route through Rehoboth Bay and by a canal to Delaware Bay.

There are no large towns along this stretch of the coast, or that can be reached through the inlets; a number of small villages on the western shores of the bays employ small vessels in the oyster and wood trade.

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* The entrance is shown on chart **126**, scale $\frac{1}{80,000}$, price $0.50.

† Shown on charts **9** and **376**, scale of each $\frac{1}{400,000}$, price of each $0.50; **127, 128, 129, 130**, scale of each $\frac{1}{80,000}$, price of each $0.50.

Assateague Anchorage is the only one available for strangers of over 10 feet draft; it affords shelter in northerly and northeasterly winds, and the depths range from 12 to 23 feet.

From Cape Henlopen Lighthouse to Fenwick Island Lighthouse, a distance of 19¾ miles, the shore trends S., and **Rehoboth**, a summer resort 3¾ miles to the southward of Cape Henlopen Lighthouse, is the only distinct feature that can be recognized other than the lighthouses. **Indian River Inlet**, about 6¼ miles to the southward of Rehoboth, has a life-saving station on the north side of its entrance. There is a depth of 1½ feet on the bar at low water, and only vessels of less than 3½ feet can enter under the most favorable conditions. To the eastward of Rehoboth a small shoal, with 4¼ fathoms over it, lies nearly 3 miles from the shore; this is the farthest outlying danger with a less depth than 5 fathoms over it until nearly abreast of Fenwick Island Lighthouse, where the farthest detached shoals lie nearly 8 miles offshore.

For a distance of 37½ miles from Fenwick Island Lighthouse to Fishing Point (the point 2¼ miles to the southward of Assateague Lighthouse) the shore curves a little, but has a general trend of about **SSW. ¼ W.** Ocean City a summer resort on the beach, nearly 7¾ miles to the southward of Fenwick Island Lighthouse. This stretch of the coast has many outlying shoals; the farthest, lying 10½ and 12 miles from the shore, have a least depth of 4½ and 4¾ fathoms over them, while two shoals with 6½ fathoms and 7 fathoms over them lie 13½ and 15½ miles, respectively, from the shore. Inshore of these are numerous large and small detached shoals with a less depth than 4 fathoms, and some with as little as 2 fathoms, over them. To the southward of Fishing Point the shore curves to the westward about 3 miles to Chincoteague Inlet, forming the bight known as Assateague Anchorage.

From Fishing Point to Hog Island Lighthouse, a distance of 33¼ miles, the shore curves slightly to the southwestward, but the general trend is about **SSW. ¼ W.** This stretch of the coast is broken by a number of inlets, and has a few detached outlying shoals with depths of 3¼ to 5 fathoms over them lying as far as 7½ miles from the shore, and spots with 6 fathoms as much as 9½ miles from the shore. The bars at some of the inlets make off 1¾ miles from the shore.

From abreast of Hog Island Lighthouse to Cape Charles Lighthouse, a distance of 20½ miles, the coast is irregular and broken by a number of inlets. The shoals make off from the shore to a greater distance, and the offshore detached shoals are fewer than to the northward of Hog Island. Cape Charles Lighthouse (see table, page 18) is 1⅝ miles to the northward of the southern end of Smith Island, and together with Cape Charles Light-vessel is the guide for vessels bound into Chesapeake Bay from the northward, or standing along the coast.

CHINCOTEAGUE INLET*

lies 59½ miles to the southward of Cape Henlopen Lighthouse and 51½ miles to the northward of Cape Charles Lighthouse, and is the first navigable inlet to the southward of Delaware Entrance. The inlet gives access from seaward to a chain of large shallow bays, from ½ mile to 4¾ miles wide, which extend 39 miles in a northerly direction, inside the narrow beach forming the coast line between Fenwick Island and Fishing Point. The entrance, which is obstructed by a shifting bar of sand extending about 1¼ miles from the shore has a buoyed channel, in which the depth varies from 6 to 8 feet at low water; this channel leads to a good anchorage to the westward of Chincoteague Island.

Strangers seldom enter the inlet unless compelled to do so, and, on account of the narrow channel, it is advisable for strangers to take a pilot when outside the bar, making signal and standing off and on until one comes off. A draft of 8 feet can be taken in at high water when the sea is moderately rough, but it is dangerous to attempt it on the ebb current. The mean rise and fall of tides in the inlet is 2·8 feet, and high water occurs about 14 minutes later than at Sandy Hook, N. J.

Chincoteague Island is the name of the village on the island to the northward of the inlet entrance; it employs a number of small vessels in the oyster and wood trade from landings in the inland bays. The nearest railroad communication is at **Franklin City**, a small village on the western shore of Chincoteague Bay, about 4½ miles from Chincoteague Island.

Killick Shoal Lighthouse (see table, page 18) is in the southeastern end of Chincoteague Bay, where it is entered from Chincoteague Inlet. The light is the guide at night to the landing at Franklin City.

Extending about 39 miles to the northward from Chincoteague Inlet, and separated from the ocean by only a narrow strip of sand beach, are, named in order from the southward, Chincoteague Bay, Sinepuxent Bay, Isle of Wight Bay, Assawoman Bay, and Little Assawoman Bay; all of these are shallow and unimportant bodies of water. There are several small villages on the western shores of these waters, but none of

*Shown on charts **128** and **129**, scale of each $\frac{1}{80,000}$, price of each $0.50.

sufficient commercial importance to warrant a description. With local knowledge, a depth of about 5 feet can be taken to the head of Chincoteague Bay and about 3 feet to the head of little Assawoman Bay.

Sailing directions which would be of use to a stranger can not be given, on account of the nature of the bar and channel, which is liable to change at any time during a heavy easterly gale. The directions given for making Assateague Anchorage will lead nearly to the bell buoy at the entrance, beyond which the buoys and appearance of the water are the only guides for a stranger.

ASSATEAGUE ANCHORAGE*

lies to the westward of Fishing Point and to the eastward of Chincoteague Inlet; it is formed by a curve to the northward in the shore to the westward of Fishing Point, and has a diameter of about 1½ miles and affords shelter in northerly and northeasterly winds. If the wind shifts to the southward of east the anchorage is exposed to the full sweep of the sea and becomes a dangerous one. The best depth is about 3¾ fathoms and the water shoals regularly to the northward; 12 feet is found about ½ mile from the shore; the bottom, mud and sand, is good holding ground A small, narrow, nearly landlocked anchorage, with a depth of about 12 feet, has been formed by the extension of a spit to the northwestward from Fishing Point. This anchorage affords shelter from all winds, but has room for only 2 vessels each about 150 feet long. The best water is clo e to the spit, and a post-light is placed on the end of the latter to guide vessels into this anchorage. The spit forming the harbor has been extending in a northwesterly direction, and is liable to change. A stranger should use caution when entering. **Assateague Inlet** is the name of the narrow body of water on the eastern side of Chincoteague Island; its entrance from Assateague Anchorage is obstructed by a bar, which has about 3 feet in the channel at low water. Assateague Lighthouse (see table, page 18) is about 1 mile from the beach to the northward of Assateague Anchorage, and is the principal guide to the anchorage and aid in avoiding the extensive shoals to the eastward and southward of Fishing Point. Several buoys are placed to mark the shoals to the southeastward of the anchorage, and are also guides for vessels standing into Chincoteague Inlet from the northward and eastward.

SAILING DIRECTIONS TO ASSATEAGUE ANCHORAGE.

This anchorage is not recommended as it is exposed and dangerous in southerly winds; the anchorage behind Fishing Point, which affords shelter in all winds, will only accommodate a few vessels of about 10 feet draft.

1. ***From the Northward.—I. In the daytime with clear weather and smooth sea, for vessels of 12 feet or less draft.***—Stand to the southward along the shore giving it a berth of a little over 1 mile until the red buoy (nun, marked S. S.) is sighted; this buoy lies to the southeastward of Fishing Point. Leave the red buoy about 150 yards on the starboard hand and steer **WNW. ½ W.** until Assateague Lighthouse bears to the eastward of **N.** by **E. ¼ E.**, then steer for the lighthouse and anchor according to draft to the northwestward of the post-light on Fishing Point.

Remarks and Dangers.—A stranger should keep a good lookout for shoal water while standing to the southward along shore and when on the **WNW. ½ W.** course from the red buoy. At night a stranger should keep well offshore and make the Outer whistling buoy; from the latter he can lay a course (**NW. ½ W.**) for the anchorage so as to pass between the shoals off Fishing Point.

II. In the daytime with clear weather and smooth sea, for vessels of 14 to 18 feet draft.—Passing inside of Winter Quarter Shoal, stand to the southward along shore giving it a berth of 3 miles. Follow the shore at this distance passing between Blackfish Bank and Chincoteague Shoals, and when the whistling buoy (which lies about 5⅜ miles **S.** by **E. ¾ E.** from Assateague Lighthouse) is sighted, steer for it. From the whistling buoy steer **WNW. ½ W.**, passing to the southward of Turners Lump buoy (can, black), and when Assateague Lighthouse bears **NNE.** steer for it on this bearing. Anchor when in a suitable depth, with the post-light on Fishing Point bearing to the southward of E.

Remarks and dangers.—When standing to the southward, 3 miles from the beach, several spots with 13 to 17 feet of water over them (a part of Chincoteague Shoals) will be left on the starboard hand. A large can buoy, which marks the 13-foot spot on Blackfish Bank, should be left at least ¾ mile on the port hand when Assateague Lighthouse bears about **NW.** The water shoals gradually when standing for Assateague Lighthouse on the **NNE.** course; a black bell buoy, marking the entrance to Chincoteague Inlet, should be seen to the westward when at anchor.

At night vessels of over 12 feet draft should pass outside of all the shoals and approach the anchorage from the southward.

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*See footnote on page 73.

1 A. *From the Southward.—In the daytime or at night with clear weather, for vessels of 18 feet or less draft.*—When to the northward of Metomkin Inlet, the shore should be given a berth of at least 1½ miles. When Assateague Lighthouse is about 5 miles distant, bring it to bear between **NE.** by **N.** and **N.** by **E.** ¼ **E.** and steer for it, keeping it between these bearings, and anchor as directed in the preceding section.

When standing for the lighthouse the water shoals gradually, and a depth of 14 feet will be found a little over ½ mile from the beach, near the life-saving station.

2. *To the Anchorage behind Fishing Point.*—Having followed the directions in sections 1, or 1 A, preceding, when the post-light on Fishing Point bears to the eastward of **NE.** steer for it, keeping it a little on the starboard bow. As the post-light is approached the character of the harbor will be seen and the vessel should round the end of the spit at a sufficient distance not to ground on it. Anchor inside so that the vessel will clear the spit when she swings.

Remarks.—The anchorage behind Fishing Point is liable to change. At present (December, 1897) the spit is making to the northwestward and the post-light, which was originally in 2 feet of water off the end of the spit, is now on dry land. A stranger should not attempt to enter at night, especially in bad weather. Inside of the harbor the spit rises abruptly from a depth of about 12 feet, while to the eastward, toward Fishing Point, the harbor is shallow.

ASSAWOMAN INLET*

is a small opening in the beach about 4¾ miles to the southward of Chincoteague Inlet; the bar at the entrance is shallow and only navigable for boats in smooth water. The inlet communicates with several narrow creeks which form a water route for boats to the northward through Bogue Bay to Chincoteague Inlet, and to the southward through Kegotank Bay to Gargathy Inlet. The above-mentioned bays are small and shallow, the depths ranging from 1 to 5 feet.

GARGATHY INLET*

is a small unimportant opening in the beach about 12 miles to the southwestward of Assateague Lighthouse. Only local craft of 5 to 10 tons and a draft of 2 to 4 feet can enter under favorable conditions of weather and tide. Strangers never enter, as there are no pilots, or marks that can be used to guide into the channel.

METOMKIN INLET*

is about 17½ miles to the southwestward of Assateague Lighthouse and about 5½ miles to the northward of Wachapreague Inlet. The life-saving station on the northern point at the entrance is the feature most readily recognized. The inlet is of little importance; only small vessels can enter under favorable conditions of weather. The bar at the entrance is subject to changes during heavy easterly gales, and no strangers should enter without a pilot, who may be obtained from the life-saving station by making signal while outside the bar. The buoys marking the entrance can not always be depended on to indicate the best water.

Accomac, the nearest village, is about 1 mile above the head of Folly Creek, and nearly 6 miles above the life-saving station. Communication with Wachapreague Inlet exists through a channel which has a depth of about 5 feet at high water. The rise and fall of tides at the entrance of the inlet is 3·5 feet.

WACHAPREAGUE INLET*

is 23 miles to the southwestward of Assateague Lighthouse and 12¾ miles to the northeastward of Hog Island Lighthouse. The entrance is obstructed by a shifting sand bar, which extends out about 2 miles from the northern and 1½ miles from the southern side of the entrance; the depth of water in the channel over the bar varies, but about 6 feet can generally be depended on at low water with a smooth sea. Inside the inlet there is good anchorage, either back of Paramore Island or the life-saving station on Cedar Island, but these anchorages are seldom used except by small vessels familiar with the locality. Though the channel over the bar is marked by buoys, it is not safe for a stranger to enter without a pilot; one can be obtained by signal while lying-to off the outer buoy, which bears **SE.** ⅜ **E.**, distant 2½ miles, from the life-saving station just to the northward of the entrance. Inside the inlet a number of narrow channels lead to the northward into Floyds Bay, an irregular, shallow body of water that is also entered from Metomkin inlet through several narrow creeks. The mean rise and fall of tides in the inlet is about 3·5 feet.

LITTLE MACHIPONGO INLET.*

Little Machipongo Inlet is 5 miles to the northward of Hog Island Lighthouse; it is of no importance, as the channel over the bar shifts and is good for a depth of only 4 to 5 feet. Only vessels of about 5 feet draft

*Shown on chart **129**, scale $\frac{1}{80,000}$, price $0.50.

can enter with a favorable tide and smooth sea. There are no buoys to guide a stranger in entering, and the shoals make off 1½ miles from the entrance. From Little Machipongo Inlet communication in boats can be had with Wachapreague and Great Machipongo inlets through narrow channels which lead through the low marsh lands just to the westward of the beach. Sailing directions for this inlet can not be given; a vessel bound in should get a pilot from Hog Island to the southward, or from Paramore Beach life-saving station to the northward. The mean rise and fall of tides in the inlet is about 3·5 feet.

GREAT MACHIPONGO INLET.*

The entrance to this inlet is about 1¾ miles to the southward of Hog Island Lighthouse; it is obstructed by shoals which extend out from 1½ to 2¼ miles from the shore. These shoals shift in easterly gales, and the depths in the channel range from about 8 to 10 feet; the former depth can usually be depended on, but in any swell a vessel of over 7 feet draft should not attempt to enter. Strangers should take a pilot, as the buoys can not always be depended on to lead in the best water. Pilots can be obtained from the inlet or life-saving station by making signal when outside the bar, either lying-to or anchoring until boarded by one.

Great Machipongo River, which empties into the inlet from the northwestward, is navigable a distance of 12 miles for vessels of 8 feet draft. For a distance of 6 miles the least depth in the channel is about 4 fathoms. There is good anchorage in 6 to 8 fathoms of water about 2¼ miles above the life-saving station. The river, for a distance of 5 miles, and the inlet lead through a large flat, which is bare at low water and is about 8½ miles long **N.** and **S.** and 6 miles wide **E.** and **W.** The Deeps, a channel extending to the westward, joins The Thoroughfare, which connects with Sand Shoal Channel and Magothy Bay, forming a narrow inland waterway good for a draft of about 7 feet.

These waters are very little frequented, except by small vessels trading in oysters and garden produce. Sailing directions other than to follow the buoys can not be given; the outer buoy bears about **SSE.**, distant 3¾ miles from Hog Island Lighthouse. The mean rise and fall of the tides in the inlet is about 4 feet.

SAND SHOAL INLET.*

The entrance to this inlet is 7¾ miles to the southward of Hog Island Lighthouse and about 11¼ miles to the northward of Cape Charles Lighthouse. Shoals extend out nearly 3 miles from the shore, but two channels, the deepest one marked by buoys, lead into the deep water of the inlet. The shoals and channels change with heavy easterly gales and the buoys can not always be depended on to lead in the best water. A depth of 10 to 12 feet can usually be relied on in the buoyed channel, but strangers should take a pilot, lying-to outside of the outer buoy with signal set until boarded by one from **Cobbs Island**, which is on the north side of the entrance. A greater part of Cobbs Island and the buildings on it were washed away by storms in 1896 and 1897.

Sand Shoal channel is from 350 to 600 yards wide; it extends to the westward from the inlet joining The Thoroughfare (5½ miles above the life-saving station) and with it, forms an inland waterway, with a least depth of 10 feet, to Magothy Bay. The least depth in Sand Shoal Channel is about 6 fathoms and it affords good anchorage for any vessel that can enter the inlet.

The vessels entering Sand Shoal Inlet are usually of less than 150 tons register, and are engaged in the oyster trade. Sailing directions of practical use to a stranger can not be given. Strangers desiring to enter should keep over 3 miles from the shore until the life-saving station bears **W.**, and then stand inshore on the bearing until the outer buoy (black and white perpendicular stripes) is made nearly ahead; when the water shoals to 18 feet wait for a pilot. The mean rise and fall of tides in the inlet is about 3·5 feet.

SHIP SHOAL INLET.*

Ship Shoal Inlet is about 4¼ miles to the southward of Sand Shoal Inlet and 7 miles to the northeastward of Cape Charles Lighthouse. Two miles to the southward of Ship Shoal Inlet is **Little Inlet**; these two inlets have shifting bars at their entrances, and are only entered by small craft familiar with the locality. The channels are not buoyed, and strangers should not attempt to enter either under the most favorable conditions. **Smith Island Inlet** is the entrance to Magothy Bay, the shallow bay extending 7 miles to the northward on the west side of Smith Island. The entrance to the inlet is between the south end of Smith Island and Fishermans Island and is obstructed by shifting sand shoals, through which a depth of about 7 feet can be taken at low water by those familiar with the locality. There are no aids to assist a stranger in entering either Ship Shoal, Little, or Smith Island inlets. The mean rise and fall of tides is about 3·8 feet.

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*Shown on chart **130**, scale $\frac{1}{80,000}$, price $0.50.

GENERAL REMARKS ON APPROACHING OR STANDING ALONG THE COAST FROM CAPE HENLOPEN TO CAPE CHARLES.

Owing to the numerous outlying shoals this coast is a dangerous one for deep-draft vessels, and unless sure of the vessel's position by observation, the lead should be used to give warning of too close an approach from seaward. The 15-fathom curve extends from 15 to 20 miles offshore, and in thick weather vessels should keep outside this depth. The water shoals quite regularly from 30 fathoms to 15 fathoms, but inshore of the latter depth the soundings are irregular and shoals rise abruptly in many cases from about 10 fathoms of water.

There are five lighthouses and three light-vessels along the coast, and vessels approaching at night, in clear weather, will generally sight one of them before shoaling the water to less than 15 fathoms. In case the lights are not made when in this depth, it is advisable to stand alongshore until one of them is sighted.

Standing along the coast, vessels of the deepest draft usually pass outside of the light-vessels and out of sight of the land. At night, if on this track, some of the lighthouses and the three light-vessels will be sighted, so that the vessel's position can be readily determined. Sailing vessels standing to the northward inshore, and overtaken by strong northeasterly winds while to the southward of Chincoteague Shoals, should stand to the southward, as their chances of weathering the shoals are very small.

With an offshore wind and smooth sea, vessels of 16 feet or less draft can stand along the shore, giving it a berth of 3 miles. This clears the inshore shoals and leads inside of the outlying ones and the light-vessels; but the usual and better track is from one light-vessel to another.

Breakers.—In heavy easterly gales the sea breaks in about 4 to 5 fathoms of water on the outlying shoals and a heavy surf makes on the beach; as is the case on the coast of New Jersey, the safest time to land on the beach in the surf is on the ebb near low water. The bars at the entrances of the inlets are impassable in easterly gales, and even in moderate weather the sea breaks on the shoals on both sides of the channels.

Fogs are frequent in March and April; but during the remainder of the year are only occasionally met with. They are usually brought in from sea by easterly winds; westerly winds clear them away.

SAILING DIRECTIONS, DELAWARE BAY ENTRANCE TO CHESAPEAKE BAY ENTRANCE.

In passing along this stretch of coast the sailing lines to be followed depend entirely on the draft of the vessel and state of the weather, and for that reason and for greater convenience in using them, different and complete sailing directions are given under separate sections (see sections 1, 1 A, and 1 B).

1. ***From Five Fathom Bank Light-vessel to Cape Charles Light-vessel.***—I. ***For vessels of the deepest draft.***—From a position ½ mile to the eastward of Five Fathom Bank Light-vessel make good a **SSW.** ⅜ **W.** course for 57¾ miles. Winter Quarter Shoal Light-vessel should then be abeam, distant 3½ miles; the course should then be changed to **SW.** ⅛ **S.**, which, if made good for 59 miles, should lead 4 miles to the eastward of Cape Charles Light-vessel.

To enter Chesapeake Bay proceed as directed in section 2.

In easterly gales steer **S.** by **W.** ⅜ **W.** for 41 miles from Five Fathom Bank Light-vessel and then steer **SW.** ⅝ **S.** for 77 miles. Cape Charles Light-vessel should then be on the starboard beam, distant about 5 miles.

Remarks.—On the **SSW.** ⅜ **W.** course, when 25 miles from Five Fathom Bank Light-vessel, Fenwick Island Shoal Light-vessel should be nearly 5 miles distant on the starboard beam. At night, if the weather is clear, Fenwick Island Light and the light-vessels may be seen; the closest that the sailing line approaches the shore between Fenwick Island Light-vessel and Winter Quarter Shoal Light-vessel is about 12½ miles, and the soundings range irregularly from 7 to 16 fathoms.

The least depths to the eastward of the sailing line are a small spot with 6½ fathoms over it lying about 9 miles **NE.** by **E.** ½ **E.** from Winter Quarter Shoal Light-vessel and at a 7-fathom spot 17 miles **SE.** ⅜ **E.** from Fenwick Island Lighthouse.

On the **SW. ⅞ S.** course no land will be seen, even in clear weather, until nearly up to Cape Charles Light-vessel, when the trees on the southern end of Smith Island and Cape Charles Lighthouse may possibly be distinguished. On a clear night all the lights passed will be seen; Hog Island Lighthouse should be about 12½ miles distant when abeam; Cape Charles Light-vessel should be made on the starboard bow.

Dangers.—A bank 2¾ miles long in a **NE.** and **SW.** direction, with depths of 4¾ to 6 fathoms over it, lies from 2 to 3 miles to the westward of the sailing line and from 8 to 10 miles to the southward of Fenwick Island Shoal Light-vessel.

A small shoal with 4½ fathoms over it lies 3½ miles **S.** by **W. ½ W.** from Winter Quarter Shoal Light-vessel; a narrow part of this shoal with 5¾ to 6 fathoms over it extends 2½ miles **NE.** from the 4½ fathom spot and about 1 mile **SW.** from it.

II. ***For vessels of 16 feet or less draft.***—Bring Five Fathom Bank Light-vessel to bear **NE. ¾ N.** over the stern and steer **SW. ¾ S.**; this course made good for 24¾ miles should lead up to Fenwick Island Shoal Light-vessel. Give the latter a berth of at least ¼ mile on the starboard hand and steer **SSW. ⅛ W.** with the light-vessel astern. This course made good for nearly 33 miles will lead to Winter Quarter Shoal Light-vessel, and leads about ½ mile to the eastward of a shoal spot having a least depth of 3½ fathoms and lying about 7½ miles **N.** by **E. ¾ E.** from the latter light-vessel.

From Winter Quarter Shoal Light-vessel a **SW. ¾ S.** course made good for 58¾ miles will lead to Cape Charles Light-vessel.

To enter Chesapeake Bay proceed as directed in section 2.

In heavy easterly gales it is advisable to follow the directions in paragraph I, preceding.

Remarks.—On the **SW. ¾ S.** course some allowance must usually be made for the tidal currents which set in and out of Delaware Bay and diagonally across the sailing line; these currents are increased if they are with the wind or may have no influence if against the wind. Fenwick Island Shoal Light-vessel should be left on the starboard hand.

The **SSW. ⅛ W.** course leads straight for Winter Quarter Shoal Light-vessel, and besides passing about ½ mile to the eastward of a 3½-fathom spot leads about 2¼ miles to the eastward of Isle of Wight Shoal and about 1 mile to the westward of a small shoal with 4¾ fathoms over it; vessels of deep draft should keep well outside of these spots.

The **SW. ¾ S.** course from Winter Quarter Shoal Light-vessel, leads 11 miles to the eastward of Assateague Lighthouse and about 2¼ miles to the eastward of a shoal with least depth of 4 fathoms over it. Hog Island Lighthouse will be left nearly 9 miles on the starboard hand and Cape Charles Light-vessel should be made directly ahead. When passing Hog Island on a clear day the trees near the lighthouse may be seen.

Dangers.—Fenwick Island Shoal is about 1⅞ miles long in a general **NE.** and **SW.** direction, and has depths of 11 to 24 feet over it. The shoal lies about 6 miles **E.** from Fenwick Island Lighthouse and 4 miles **WNW. ¾ W.** from Fenwick Island Shoal Light-vessel, and is marked at its western edge by a red whistling buoy marked F. I. S. in white letters. There is a spot with 4¾ fathoms over it about 2⅝ miles **NW.** by **N.** from the light-vessel.

Isle of Wight Shoal is about 1 mile long in a general **NE.** and **SW.** direction and has a least depth of 16 feet over it; the shoalest part lies 7 miles **SE. ¾ E.** from Fenwick Island Lighthouse and 4½ miles **SW.** by **W. ⅛ W.** from Fenwick Island Shoal Light-vessel. A red and black horizontally striped buoy with I. W. S. in white letters marks the southwestern end of the shoal.

A small 3½-fathom spot lies about midway between Fenwick Island Shoal and Isle of Wight Shoal.

A shoal about 1¾ miles long in a general **NE.** and **SW.** direction and having depths of 3½ to 5 fathoms over it lies 7½ miles from the shore and 7½ miles **NNE.** from Winter Quarter Shoal Light-vessel.

Winter Quarter Shoal is about 1½ miles long in a general **NE.** and **SW.** direction and has depths of 12 to 24 feet over it; the southwestern edge is marked by a buoy (red and black horizontal stripes, with W. Q. S. in white letters). The shoal bears **ENE. ¾ E.**, distant 10¾ miles, from Assateague Lighthouse and from 3 to 3½ miles in a general **NW.** by **N.** direction from Winter Quarter Shoal Light-vessel.

There is **a spot** with 4½ fathoms over it lying 3½ miles **S.** by **W. ½ W.** from Winter Quarter Shoal Light-vessel, and one with 4 fathoms over it lying 7 miles **SW. ¾ W.** from the light-vessel.

1 A. ***From Cape Henlopen to Cape Charles Light-vessel.***—I. ***For vessels of the deepest draft.***—Passing out of Delaware Bay through the Main Channel bring Cape Henlopen Lighthouse to bear **W.**, distant 3 miles, and steer **SSE. ½ E.** for 10 miles, then steer **S. ¾ E.** for 12½ miles, which will lead ½ mile to the eastward of Fenwick Island Shoal Light-vessel; from the latter steer **S.** for 24 miles, and then make good a **SW. ⅝ S.** course for 72 miles, when Cape Charles Light-vessel should be on the starboard beam, distant 5 miles.

To enter Chesapeake Bay, proceed as directed in section 2.

Remarks.—The above courses lead in a least depth of about 9 fathoms and avoid the numerous shoals between Fenwick Island Shoal and Winter Quarter Shoal light-vessels. The **S.** course passes about 3 miles to the westward of a 7-fathom spot when about 10 miles to the southward of Fenwick Island Shoal Light-vessel. This is the only shoal outside of the sailing lines. (See the Remarks and Dangers under section 1, Paragraph I, page 77.)

II. ***For vessels of 18 feet or less draft with an offshore wind to pass outside of Winter Quarter Shoal.***—Passing out of Delaware Bay bring Cape Henlopen Lighthouse to bear **WNW.**, distant about $2\frac{1}{4}$ miles, then make good a **S.** $\frac{1}{8}$ **W.** course for about 21 miles. When Fenwick Island Lighthouse bears **NW.**, distant 3 miles, make good a **S.** by **W.** $\frac{1}{8}$ **W.** course for 30 miles to Winter Quarter Shoal Light-vessel, and then a **SW.** $\frac{3}{4}$ **S.** course for $58\frac{3}{4}$ miles to Cape Charles Light-vessel.

To enter Chesapeake Bay proceed as directed in section 2.

Remarks.—The **S.** $\frac{1}{8}$ **W.** course leads $\frac{1}{2}$ mile to the eastward of Hen and Chickens Shoal buoy and along at distances of $1\frac{3}{4}$ to $2\frac{1}{4}$ miles from the shore. Fenwick Island Shoal is left about $3\frac{1}{4}$ miles on the port hand. The least depth should be about $4\frac{1}{2}$ fathoms. When the course is changed to **S.** by **W.** $\frac{1}{8}$ **W.**, the hotel at Ocean City will be seen, on a clear day, broad off the starboard bow; and when the hotel bears about 2 points abaft the beam Little Gull Bank (Gull Shoal) buoy should be a little over $\frac{1}{2}$ mile on the starboard beam. The course leads across Great Gull Bank in about 5 fathoms, and Winter Quarter Shoal Light-vessel should be made ahead and should be left about $\frac{1}{2}$ mile on the port hand.

See the remarks under section 1, paragraph II, page 78, for remarks on the **SW.** $\frac{3}{4}$ **S.** course.

Dangers.—Hen and Chickens Shoal is described on page 61, and Fenwick Island Shoal on page 78.

Little Gull Bank (Gull Shoal) is a narrow shoal about $1\frac{1}{2}$ miles long in a general **NE.** and **SW.** direction, has 12 to 18 feet of water over it with good water between it and the shore, and lies from $1\frac{3}{4}$ to $2\frac{1}{4}$ miles offshore to the southeastward of Ocean City. The northeastern end of the bank is marked by a buoy (black, G. S. in white letters) which lies about **SE.** $\frac{3}{4}$ **E.** about $2\frac{3}{4}$ miles from the large hotel at Ocean City.

Great Gull Bank has from $3\frac{3}{4}$ to 5 fathoms of water over it and is about 3 miles long in a general **NE.** and **SW.** direction. The southwestern end of the bank is about $3\frac{1}{4}$ miles from the shore and bears **S.** by **E.** from the hotel at Ocean City; the northeastern end is **SE.** distant $4\frac{5}{8}$ miles from the hotel. There is deep water between this bank and Little Gull Bank.

Winter Quarter Shoal is described on page 78.

There is **a shoal** with 4 fathoms over it lying about $4\frac{1}{2}$ miles from the shore and $8\frac{3}{4}$ miles to the northward of Winter Quarter Shoal Light-vessel. The sailing line leads nearly $1\frac{3}{4}$ miles to the eastward of this shoal, and a little over $1\frac{1}{2}$ miles to the westward of a shoal with $3\frac{1}{2}$ fathoms of water over it.

1 B. ***From Cape Henlopen to Cape Charles.—For light-draft vessels with an offshore wind—to pass close alongshore.***—Passing out of Delaware Bay bring Cape Henlopen Lighthouse to bear **WNW.**, distant about $2\frac{1}{4}$ miles, and make good a **S.** $\frac{1}{8}$ **W.** course for about 19 miles. When Fenwick Island Lighthouse bears abeam, distant $2\frac{1}{8}$ miles, a **SSW.** $\frac{1}{8}$ **W.** course made good for $36\frac{1}{2}$ miles should bring Assateague Lighthouse to bear abeam **NW.** by **W.** $\frac{1}{8}$ **W.**, distant $4\frac{1}{2}$ miles. From this position make good a **SW.** by **S.** course for 52 miles; Cape Charles Lighthouse should then bear **W.**, distant about $5\frac{1}{2}$ miles, and the course should be changed to **SW.** $\frac{1}{4}$ **W.**, keeping about 3 miles distant from the shore of Smith Island.

If desiring to stand for Cape Charles Light-vessel.—When Assateague Lighthouse bears abeam make good a **SSW.** $\frac{5}{8}$ **W.** course for 52 miles.

Or, when Assateague Lighthouse is abeam, distant $4\frac{1}{2}$ miles, if desiring to run closer inshore.—Steer **SSW.** $\frac{5}{8}$ **W.** for 4 miles, the outer whistling buoy should then be close aboard; from this buoy steer about **W.** by **S.** nearly $7\frac{3}{4}$ miles, when the vessel should be about 2 miles from the beach. From this position a **SSW.** course made good, should lead outside of the shoals until Hog Island Lighthouse bears abeam (**WNW.**), distant $3\frac{1}{4}$ miles. (A good general rule to follow is to give the shore between Assateague Anchorage and Hog Island Lighthouse a berth of at least 2 miles.) After Hog Island Light has been brought to bear abeam steer **SSW.** $\frac{1}{2}$ **W.**, taking care not to shoal the water to less than 18 feet. When Cape Charles Lighthouse is sighted and bears to the westward of **W.** by **S.**, steer **SW.**, following the beach at a distance of about 3 miles.

Remarks.—The **S.** $\frac{1}{8}$ **W.** course leads to the eastward of Hen and Chickens Shoal and from $1\frac{3}{4}$ to $2\frac{1}{4}$ miles from the shore.

On the **SSW.** $\frac{1}{8}$ **W.** course a vessel will gradually approach the shore, but in no place closer than $\frac{3}{4}$ mile. While to the northward of Ocean City care should be taken to avoid the 11-foot spot which lies a little over 1 mile from the beach; there is good water between this shoal and the beach. Ocean City should be left about

¾ mile on the starboard beam and care should be taken not to haul farther offshore while to the southeastward of Ocean City, thus avoiding the southwestern end of Little Gull Bank. After passing Green Run Inlet Life-Saving Station, about 13 miles to the northward of Assateague Lighthouse, the sailing line draws off the land gradually, leading to the eastward of the northeastern end of Chincoteague Shoals and to the westward of the northeastern end of the Blackfish Bank.

The **SW.** by **S.** course leads to the eastward of the main part of Chincoteague Shoals and about ¼ mile to the eastward of the whistling buoy. When to the southward of the whistling buoy the shore is given a berth of about 8 miles, but the sailing line draws in toward the land gradually, and when crossing Paramore Banks the shore will be about 5 miles distant. Hog Island Lighthouse should be left at least 4 miles on the starboard hand and care should be taken not to approach the shore closer than 3 miles when to the southward of the lighthouse.

The **SSW.** ⅝ **W.** course for Cape Charles Light-vessel leads across the end of Porpoise Bank in about 6 fathoms of water, and over Paramore Banks in about 5 fathoms of water. Hog Island Lighthouse will be left about 6½ miles on the starboard beam and Cape Charles Light-vessel be made ahead.

When standing along the beach on the **SSW.** and **SSW.** ½ **W.** courses care should be taken to pass outside of the buoys marking the entrances to some of the inlets. In the daytime, with clear weather, the discolored water will usually give warning of too close an approach to the shoals.

The old light tower on Hog Island is about ½ mile to the southward of the lighthouse; and the old light tower at Cape Charles is about ¾ mile to the eastward of Cape Charles Lighthouse.

Dangers.—Hen and Chickens Shoal is described on page 61, Little Gull Bank on page 79, and Winter Quarter Shoal on page 78.

There is a spot with 11 feet of water over it lying a little over 1 mile from the beach and about 3 miles **NE.** ½ **E.** from Ocean City.

Chincoteague Shoals is the general name of the shoals making off from, and the detached shoals lying to the eastward of, Fishing Point. The shoals making off from the point about ¾ mile in a southerly and 1½ miles in an easterly direction, having depths of 6 to 18 feet over them, are known as **Ship Shoal** and are marked on their southeastern side by a buoy (red, S. S. in white letters). **Turners Lump** is a narrow shoal about 1⅛ miles long **E.** and **W.**, with depths of 9 to 13 feet over it, lying 1½ miles to the southward of Fishing Point. The southern side of the shoal is marked by a buoy (black, No. 1, W. T. L. in white letters). Between the western end of Turners Lump and Ship Shoal are detached shoals with 15 to 18 feet of water over them. A number of detached lumps with 13 to 18 feet of water over them, and forming a part of Chincoteague Shoals, lie about 2½ miles from the shore **SE.** by **E.** ¾ **E.** from Assateague Lighthouse, and extend in a southwesterly direction nearly to Turners Lump. There is deeper water between these lumps and Ship Shoal and Turners Lump. Outer whistling buoy (black) is outside of Chincoteague Shoals and bears **S.** by **E.** ¾ **E.**, distant 5¼ miles, from Assateague Lighthouse.

Blackfish Bank is about 5 miles long in a **NE.** and **SW.** direction and about ½ mile wide; it has depths of 3¼ to 5 fathoms on it and lies about 1½ miles to the eastward of the outer Chincoteague Shoals. A part of this bank about ⅞ mile long in a **NE.** by **N.** and **SW.** by **S.** direction, and lying 5½ miles **SE.** ¼ **S.** from Assateague Lighthouse, has depths of 13 to 18 feet over it; about ¼ mile to the eastward of the 13-foot spot is a buoy (black, B. F. B. in white letters).

Porpoise Bank is a number of small detached lumps, with 5½ to 7 fathoms of water over them, lying from 9 to 12 miles to the southward of Fishing Point.

Paramore Banks is the name given to extensive detached shoals, with a least depth of 3½ fathoms over one of them and a general depth of 4 to 6 fathoms. The outer of these shoals lie 8 miles from the shore to the eastward of Wachapreague Inlet and Paramore Beach.

Shoals extend out 2 miles from the shores between the inlets to the southward of Hog Island Lighthouse, and off the entrances to some of the inlets they extend out nearly 3 miles.

Shark Shoal has a least depth of 17 feet over it and lies about 4¾ miles **SE.** ¾ **E.** from Cape Charles Lighthouse; the general depth on the shoal is about 19 feet. There are several spots with 21 feet over them about 2¼ miles to the northeastward of the shoal.

Smith Island Shoal is small and has a least depth of 17 feet over it, lying 1½ miles **WNW.** ½ **W.** from Cape Charles Light-vessel.

2. ***To Enter Chesapeake Bay.***—The entrance may be approached boldly from the eastward, as there are no outlying dangers. Twenty fathoms will be found about 45 miles to the eastward of Cape Henry; inside that depth the water shoals irregularly. In clear weather Cape Henry and Cape Charles lighthouses and Cape Charles Light-vessel will be made about the same time. In thick weather safety may be insured by keeping in 10 fathoms. When in latitude 37° 00′ **N.**, and 30 fathoms of water, a due **W.** course will lead directly for Cape Henry Lighthouse.

Deep-draft vessels to insure a depth of over 7 fathoms.—Bring Cape Charles Light-vessel to bear **NW.**, distant 4 miles, and steer **SW.** ½ **S.** for 14¼ miles; then steer **NW.** ¼ **W.** until Cape Henry Lighthouse bears on the port beam, distant nearly 2 miles. From this position steer **WNW.** ⅜ **W.**, then—

Vessels of 20 feet or less draft.—Bring Cape Charles Light-vessel to bear **NE.** ½ **E.** and make good a **SW.** ½ **W.** course for about 14½ miles, or until Cape Henry Lighthouse bears **W.** ½ **S.**, distant about 4¼ miles (Cape Charles Lighthouse, if visible, will then bear about **N.** ½ **E.**). Now make good a **WNW.** ⅜ **W.** course, passing about 1¾ miles to the northward of Cape Henry Lighthouse, and then—

If bound up the bay, when Cape Henry Lighthouse bears **SSE.**, steer **NNW.**, keeping the lighthouse on the bearing astern. This course should be made good until Cape Henry Lighthouse is 8 miles distant astern and Cape Charles Lighthouse bears abeam; then steer **NW.** ¾ **N.** for 5½ miles, when Back River Lighthouse will bear **WSW.** ¾ **W.**, distant about 6 miles; from this position be guided by the chart or sailing directions given in "U. S. Coast Pilot, Part VI, Chesapeake Bay and Tributaries."

If bound into Hampton Roads, continue on the **WNW.** ⅜ **W.** course past Cape Henry Lighthouse for about 8½ miles, until up to the Outer Mid-channel buoy (white and black perpendicular stripes); from this buoy be guided by the sailing directions for Hampton Roads, given in "U. S. Coast Pilot, Part VI, Chesapeake Bay and Tributaries,"

Vessels of 14 feet or less draft, with smooth water.—Bring Cape Charles Light-vessel to bear **ENE.** and steer **WSW.** for 13 miles from the light-vessel; the bell buoy off the southeast end of the Middle Ground should then be ¼ mile distant on the starboard hand. Then steer **W.** ½ **N.**, and if bound up the bay change the course to **NNW.** when Cape Henry Lighthouse bears **SSE.**; or, if bound to Hampton Roads, continue the **W.** ½ **N.** course and pass ⅜ mile **S.** of Thimble Shoal Lighthouse.

Remarks.—On the **SW.** ½ **S.** course the depths should not be less than 7¾ fathoms. Having stood on this course 14¼ miles, Cape Henry Lighthouse should bear **NW.** by **W.** ⅜ **W.** and be distant nearly 9½ miles. On the **NW.** ¼ **W.** course Cape Henry Lighthouse should be made on the port bow and the whistling buoy, at the entrance to Chesapeake Bay, should be left nearly 1½ miles on the starboard hand.

On the **SW.** ½ **W.** course from Cape Charles Light-vessel, Cape Henry Lighthouse should be made on the starboard bow. The **WNW.** ⅜ **W.** course should lead nearly 1 mile to the southward of the whistling buoy at the entrance to Chesapeake Bay.

On the **WSW.** course from Cape Charles Light-vessel, Cape Henry Lighthouse will be made on the port bow. The bell buoy off the southeast end of the Middle Ground should be made a little on the starboard bow.

When inside of Cape Henry, on a clear day or night, Thimble Shoal Lighthouse will be made a little on the starboard bow when on the **WNW.** ⅜ **W.** course or the **W.** ½ **N.** course.

The **NNW.** course will, at night, lead along on the edge of the red and white rays of Cape Henry Light. As the course is changed to **NW.** ¾ **N.** Cape Charles Light should be on the starboard beam, and while standing on this course York Spit Light should be made ahead.

Dangers.—**Smith Island Shoal** has a least depth of 17 feet over it, and lies about 7¾ miles **ESE.** ¾ **E.** from Cape Charles Lighthouse and about 1½ miles to the westward of Cape Charles Light-vessel.

Shark Shoal has a least depth of 17 feet over it, and lies about 4¼ miles **SE.** ¾ **E.** from Cape Charles Lighthouse; this shoal is not marked.

Shoal water (less than 18 feet) is found 1¾ miles offshore to the northward of Cape Charles Lighthouse, and 4 miles offshore to the southward of the southern end of Smith Island. These shoals are not marked and care should be taken to avoid them.

The **Lower Middle Ground** has 20 to 23 feet of water over it, and lies about 3¼ miles to the northeastward of Cape Henry Lighthouse. It is about 3 miles long **E.** and **W.**, and nearly 1¼ miles wide **N.** and **S.** There is a little more than 4 fathoms of water between the Lower Middle Ground and the buoys marking the southeastern end of the Middle Ground. Outer Entrance whistling buoy is placed off the southeastern end of the Lower Middle Ground.

The **Middle Ground** is the southern and westernmost of the shoals which lie to the southwestward of Cape Charles; it has a general depth of 14 to 17 feet over it, and extends for a distance of 9 miles along the eastern side of the main channel of Chesapeake Bay; the width of the Middle Ground between 18-foot curves is ¼ to ½ mile. The southern and western edge of the Middle Ground rises abruptly from the deep water of the bay; on the eastern side are several channels leading between the shoals lying between the Middle Ground and Cape Charles. The southeastern end of the Middle Ground is 5¾ miles **N.** by **E.** ½ **E.** from Cape Henry Lighthouse; about 1 mile **SE.** from this end are two buoys, one red, No. 4, and the other a red bell buoy. About 7½ miles **NW.** from the bell buoy and about 5½ miles **W.** from the Quarantine Station on Fishermans Island, is the Middle Ground buoy (red, No. 6), which marks the western edge of the shoal. About 3½ miles **N.** by **W.** ¾ **W.** from this buoy, and 6¼ miles **SW.** ¾ **S.** from Old Plantation Flats Lighthouse, is Middle Ground north end buoy (red, No. 8). Deep-draft vessels should pass at least 1¼ miles to the westward of this buoy. (*See Supplement, Art. 35.*)

Numerous shoal spots of a shifting nature and varying depth lie to the northward of the bell buoy, between it and Cape Charles. These spots are all avoided by following the sailing directions. A buoyed channel (North Channel) leads through these shoals and along the eastern edge of the Inner Middle Ground, but a stranger should not attempt it.

APPENDIX I.

PILOTS AND PILOTAGE, HARBOR CONTROL, QUARANTINE, ETC.

NEW YORK.

PILOT LAWS IN REFERENCE TO VESSELS ENTERING BY WAY OF SANDY HOOK.

Extracts from the New York City Consolidation Act of 1882.

Section 2100. * * * * Any pilot bringing in a vessel from sea shall, by himself or one of his boat's company, be entitled to pilot her to sea when she next leaves the port, unless, in the meantime, a complaint for misconduct or incapacity shall have been made against such pilot or one of his boat's company, and proved before the Board of Commissioners of Pilots; provided, however, that if the owner of any vessel shall desire to change such pilot, then the said commissioners may assign any other pilot on the same pilot boat to pilot said vessel to sea.

[***Secs. 2101–2102*** of this act, fixing the fees for pilotage, were repealed by an act of the State legislature, passed April 3, 1884, and the latter act as amended in 1889, established the fees now authorized, as follows:]

SEC. 1. The fees for piloting for the port of New York, by the way of Sandy Hook, are hereby established as follows:

For every vessel inward bound, and not exempted from pilotage by any law of this State or any regulation thereunder, and drawing less than fourteen feet of water, two dollars and seventy-eight cents per foot.

For every vessel drawing fourteen feet, and less than eighteen feet, of water, three dollars and thirty-eight cents per foot.

For every vessel drawing eighteen feet, and under twenty-one feet, of water, four dollars and thirteen cents per foot.

For every vessel drawing twenty-one feet of water and upward, four dollars and eighty-eight cents per foot.

If the master or owners of any vessel shall request the pilot to moor said vessel to any place within Sandy Hook, and not to be taken to the wharf or harbor of New York, or the vessel be detained at quarantine, the same pilotage shall be allowed, and the pilot entitled to his discharge.

When any ship or vessel bound for the port of New York, and boarded by any pilot appointed by the Board of Commissioners of Pilots of the City of New York, at such distance to the southward or eastward of Sandy Hook Lighthouse, as that said lighthouse could not be seen from the deck of such ship or vessel in the daytime, and in fair weather, the addition of one-fourth to the rates of pilotage hereinbefore mentioned shall be allowed to such pilot, provided the commander of such vessel shall have agreed to pay such addition. But such additional rate my be waived by the pilot boarding or offering his services to any vessel, and if waived he shall be taken on board and shall be entitled to pilot such vessel, and to be paid at the ordinary rates established by law. In case of the refusal of the commander of any vessel to take such pilot after such waiver, he and the owner or consignee of the vessel shall be liable to pay such pilot at the ordinary rate, the same as if he had piloted the vessel to the port of New York. In case the same additional rate of pilotage is not waived by the pilot so boarding or speaking any vessel, the commander, owner, or consignee shall not be liable to pay any pilotage, except that in case of failing to take a licensed pilot before such vessel reaches the port of New York, the pilotage shall be paid at the ordinary rate to the pilot who first offers his services. Whenever the services of a pilot by the way of Sandy Hook shall be required to pilot any vessel sailing from any other port in the United States to the port of New York, application must first be made in writing by the master, owner, or consignee of such vessel to the board of commissioners of pilots for such pilot, and the said board shall thereupon designate the pilots so to be employed. * * * *

SEC. 2. The pilotage on vessels outward bound not exempt from pilotage shall be as follows:

For every vessel drawing less than fourteen feet of water, two dollars and two cents per foot.

For every vessel drawing fourteen feet, and less than eighteen feet of water, two dollars and thirty-three cents per foot.

For every vessel drawing eighteen feet, and less than twenty-one feet of water, three dollars and eight cents per foot.

For every vessel drawing twenty-one feet of water and upward, three dollars and fifty-six cents per foot.

Sec. 2103. The rates of pilotage for any intermediate distance shall be determined by the Board of Commissioners, and promulgated in their rules and regulations for the government of pilots.

Sec. 2104. Between the first day of November and the first day of April, inclusive, four dollars shall be added to the full pilotage of every vessel coming into or going out of the port of New York.

Sec. 2105. For every day of detention in the harbor of an outward bound vessel, after the services of a pilot have been required and given, except detention shall be caused by such adverse winds and weather that the vessel can not get to sea; and for every day of detention of an inward bound vessel by ice longer than two days for passage from sea to wharf, three dollars shall be added to the pilotage. If any pilot shall be detained at quarantine or elsewhere, by the health officer, for being or having been on board a sickly vessel as pilot, the master, owner or agent, or consignee of such vessel shall pay to such pilot all necessary expenses of living and three dollars per day for each and every day of such detention. This section shall not apply to vessels propelled wholly or in part by steam, owned or belonging to citizens of the United States, and licensed and engaged in the coasting trade.

Sec. 2106. For every day of detention at the wharf, or in the harbor, beyond the time notified to the pilot for him to attend the vessel, or beyond the usual time of getting vessels from sea to the wharf, and from the wharf to sea; and for every day of detention of an inward bound vessel by ice, longer than two days for the passage from sea to wharf, three dollars shall be added to the pilotage. If any pilot shall be detained at quarantine by the health officer for having been on board a sickly vessel as pilot, the master, owner, agent, or consignee of such vessel shall pay to such pilot all necessary expenses of living and three dollars per day for each and every day of such detention. This section shall not apply to vessels embraced in the preceding section.

Sec. 2107. For services rendered by pilots in moving or transporting vessels in the harbor of New York, the following shall be the fees: For moving from North to East river, or vice versa, * * * * * a merchant vessel, five dollars, except such vessel shall have arrived from sea, or is ready for and bound to sea on the day such services for transportation are rendered; but if the services are rendered thereafter such payment shall be made. For moving any vessel from the quarantine to the city of New York, one-quarter of the sum that would be due for the inward pilotage of such vessel. For hauling any vessel from the river to a wharf, or from a wharf into the river, three dollars, except on the day of arrival of or departure of such vessel. The provisions of this section shall not apply to vessels propelled wholly or in part by steam, owned or belonging to citizens of the United States, and licensed and engaged in the coasting trade.

Sec. 2108. For services rendered by pilots in moving or transporting vessels in the harbor of New York other than those embraced in the preceding section, the following shall be the fees:

For moving from North to East river, or vice versa, a merchant vessel, five dollars.

For moving any vessel from quarantine to the city of New York, one-quarter of the sum that would be due for the inward pilotage of such vessel.

For hauling any vessel from the river to a wharf, or from a wharf into the river, three dollars.

Sec. 2109. The pilotage shall be payable by the master, owner, consignee, or agent entering or clearing the vessel at the port of New York, who shall be jointly and severally liable therefor.

Sec. 2110. A pilot who is carried to sea when a boat is attending to receive him shall receive at the rate of one hundred dollars per month during his necessary absence.

Sec. 2111. Masters of vessels shall give an account to the pilot when boarding of the draft of such vessels; and in case the draft given is less than the actual draft, the master shall forfeit the sum of twenty-five dollars, which may be sued for and recovered by the commissioners, as is provided in section twenty-one hundred and twenty-three, in respect to other fines and penalties.

Sec. 2119. No master of any vessel navigated under a coasting license and employed in the coasting trade, by the way of Sandy Hook, shall be required to employ a licensed pilot when entering or departing from the harbor of New York; but this provision shall not be construed to alter the legal rate of compensation of any pilot who may be so employed; but in case the services of a pilot shall have been given, the pilot shall be entitled to the rates

established by this title. If the master of any vessel above one hundred and fifty and not exceeding three hundred tons burden, and owned by a citizen of the United States, and sailing under a coasting license to or from the port of New York, by the way of Sandy Hook, shall be desirous of piloting his own vessel, he shall first obtain a license for such purpose from the Commissioners of Pilots, who are hereby authorized and required to grant the same, if such master shall, after an examination had by said commissioners, be deemed competent; which said license shall be and continue in force one year from the date thereof, or until the determination of any voyage during which the license may expire. For such license, the master to whom it shall be granted shall pay to the said commissioners four cents per ton. All masters of foreign vessels and vessels from a foreign port, and all vessels sailing under register, bound to or from the port of New York by the way of Sandy Hook, shall take a licensed pilot; or in case of refusal to take such pilot, shall himself, owners, or consignees pay the said pilotage as if one had been employed; and such pilotage shall be paid to the pilot first speaking or offering his services as pilot to such vessel. Any person not holding a license as pilot under this title, or under the laws of the State of New Jersey, who shall pilot, or offer to pilot, any ship or vessel to or from the port of New York by the way of Sandy Hook, except such as are exempt by virtue of this title, or any master, or person on board a steam tug or towboat, who shall tow such vessel or vessels, shall be deemed guilty of a misdemeanor, and, on conviction, shall be punished by a fine not exceeding one hundred dollars or imprisonment not exceeding sixty days; and all persons employing a person to act as a pilot, not holding a license under this title, or under the laws of the State of New Jersey, shall forfeit and pay to the Board of Commissioners of Pilots the sum of one hundred dollars. This section shall not apply to vessels propelled wholly or in part by steam, owned or belonging to citizens of the United States, and licensed and engaged in the coasting trade.

Sec. 2120. Any person not holding a license as pilot under this title, or under the laws of the State of New Jersey, who shall pilot or offer to pilot any ship or vessel, not embraced in the preceding section, to or from the port of New York by the way of Sandy Hook, shall be deemed guilty of a misdemeanor, and on conviction shall be punished by a fine not exceeding one hundred dollars, or imprisonment not exceeding sixty days; and all persons employing a person to act as pilot not holding a license under this title, or under the laws of the State of New Jersey, shall forfeit and pay to the Board of Commissioners of Pilots the sum of one hundred dollars.

Sec. 2121. It shall be the duty of each branch and deputy pilot belonging to the port to use his utmost endeavors to hail every vessel he shall discover entering the port, and to interrogate the master of such vessel in reference to all matters necessary to enable such pilot to determine whether such vessel be subject to quarantine.

Sec. 2122. If from the answers obtained from such inquiries it shall appear that such vessel came from a port where any quarantinable disease existed at the time of her departure, or that any case of such disease shall have occurred on board of her during the passage, the pilot shall immediately direct the master of the vessel to proceed and anchor such vessel at the quarantine anchorage in the lower bay. In other cases of vessels liable to quarantine he shall direct the masters thereof to proceed and anchor such vessels at such point as shall be assigned by the quarantine commissioners as an anchorage for such vessels.

BY-LAWS OF THE BOARD OF COMMISSIONERS OF PILOTS.*

(*Extracts.*)

9th. All boats shall have conspicuous numbers in their sails. * * * *

11th. No boat shall put a boy or other person than an adequately licensed pilot on board a vessel for the purpose of piloting said vessel. * * * * * * * * This shall not apply to vessels in distress, providing the masters of such vessels are willing to employ the services of such boy, person, or pilot; such boy, person, or pilot shall keep the signal for a pilot flying until the lighthouse on Sandy Hook bears south—and in case a regular pilot takes charge of the vessel, the person who first took charge shall be entitled to half the inward pilotage.

15th. Pilots are required to board the nearest vessel having a signal flying for a pilot, except in case there should be a vessel in sight with a signal of distress, under a penalty of fifty dollars.

17th. Pilots are required to transport a vessel to any part of the port of New York, when applied to, under a penalty of twenty-five dollars.

21st. Pilotage for taking vessels from [Upper to Lower] Quarantine:

For vessels having had death or sickness on board, double outward pilotage.

For vessels from sickly ports, but having no sickness on board, single outward pilotage.

Pilotage of vessels from Quarantine to New York, quarter pilotage.

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*The office of the Board of Commissioners of Pilots is at No. 24 State street.

Pilotage of vessels from New York to Perth Amboy, or from Perth Amboy to New York, except on the voyage to or from sea, shall be one dollar and a half per foot of the vessel's draft.

Pilotage of vessels from the North River or the East River to Bayonne, or *vice versa*, ten dollars each way.

In case of vessels bound over Sandy Hook Bar to or from points in Newark Bay, Staten Island Sound, the Passaic, Hackensack, or Raritan rivers, only one full pilotage shall be paid; of which two-thirds shall be paid to the pilot piloting the vessel over Sandy Hook Bar and one-third to the local pilot.

Provided, however, that if the Bar pilot is competent to pilot the vessel the whole way he shall be entitled to do so, and to receive the full pilotage, the same as if the vessel was piloted to or from New York, Jersey City, or Brooklyn.

22d. Vessels boarded north or west of a line drawn from the lights on the Highlands of Navesink to the Black Buoy No. 1 of the Bar, thence to the Red Buoy No. 2, of Gedney Channel, shall pay half pilotage only. If boarded above The Narrows, quarter pilotage. This by-law has no reference to section [21].

24th. No pilotage, except the regular inward pilotage, shall be allowed when vessels are detained from the *nonvisiting* of the health officer.

25th. Vessels returning from sea in consequence of head winds or stress of weather, shall pay full pilotage.

34th. A pilot boat when in sight of a vessel wanting a pilot shall, if there are no pilots on board, signalize the fact by running her flag or signal up and down twice in the daytime; and at night, by making a like signal with her masthead light.

36th. A pilot in charge of a vessel is required to stay on board until notified by the master that his services are no longer wanted, under penalty of forfeiting the pilotage. The omission of the master to inform the pilot that his services are not wanted, will entitle the pilot to detention money, unless the detention is temporary, to take out *passengers*.

42d. The master of every vessel bound to or from New York, when in the act of receiving or discharging a New York pilot, shall bring his vessel to a stop, and shall give all necessary assistance to the pilot, consistant with the safety of his vessel, to enable said pilot to board or leave the vessel safely; under a penalty, payable by the vessel and recoverable by this Board, of twenty-five dollars for every omission to comply with this regulation.

Any pilot who willfully or through negligence causes unnecessary delay to a vessel, in the act of boarding or leaving her, shall be subject to a like penalty of twenty-five dollars, recoverable by this Board, for each offense.

43d. Pilots are required to anchor vessels of which they have charge, in accordance with the regulations promulgated by the United States anchorage officer.

RATES OF PILOTAGE FROM APRIL 1 TO NOVEMBER 1.

DRAFT.	INWARD.				OUTWARD.	
	RATE.	PILOTAGE.	OFFSHORE.	TOTAL.	RATE.	PILOTAGE.
6 feet 0 inches	$2.78	$16.68	$4.17	$20.85	$2.02	$12.12
6 " 6 "	2.78	18.07	4.52	22.59	2.02	13.13
7 " 0 "	2.78	19.46	4.86	24.32	2.02	14.14
7 " 6 "	2.78	20.85	5.21	26.06	2.02	15.15
8 " 0 "	2.78	22.24	5.56	27.80	2.02	16.16
8 " 6 "	2.78	23.63	5.91	29.54	2.02	17.17
9 " 0 "	2.78	25.02	6.25	31.27	2.02	18.18
9 " 6 "	2.78	26.41	6.60	33.01	2.02	19.19
10 " 0 "	2.78	27.80	6.95	34.75	2.02	20.20
10 " 6 "	2.78	29.19	7.30	36.49	2.02	21.21
11 " 0 "	2.78	30.58	7.64	38.22	2.02	22.22
11 " 6 "	2.78	31.97	7.99	39.96	2.02	23.23
12 " 0 "	2.78	33.36	8.34	41.70	2.02	24.24
12 " 6 "	2.78	34.75	8.69	43.44	2.02	25.25
13 " 0 "	2.78	36.14	9.03	45.17	2.02	26.26
13 " 6 "	2.78	37.54	9.38	46.92	2.02	27.27
14 " 0 "	3.38	47.32	11.83	59.15	2.33	32.62
14 " 6 "	3.38	49.01	12.25	61.26	2.33	33.78
15 " 0 "	3.38	50.70	12.67	63.37	2.33	34.95
15 " 6 "	3.38	52.39	13.10	65.49	2.33	36.11
16 " 0 "	3.38	54.08	13.52	67.60	2.33	37.28
16 " 6 "	3.38	55.77	13.94	69.71	2.33	38.44
17 " 0 "	3.38	57.46	14.36	71.82	2.33	39.61
17 " 6 "	3.38	59.15	14.79	73.94	2.33	40.77
18 " 0 "	4.13	74.34	18.58	92.92	3.08	55.44
18 " 6 "	4.13	76.40	19.10	95.50	3.08	56.98
19 " 0 "	4.13	78.47	19.62	98.09	3.08	58.52
19 " 6 "	4.13	80.53	20.13	100.66	3.08	60.06
20 " 0 "	4.13	82.60	20.65	103.25	3.08	61.60
20 " 6 "	4.13	84.66	21.16	105.82	3.08	63.14
21 " 0 "	4.88	102.48	25.62	128.10	3.56	74.76
21 " 6 "	4.88	104.92	26.23	131.15	3.56	76.54
22 " 0 "	4.88	107.36	26.84	134.20	3.56	78.32
22 " 6 "	4.88	109.80	27.45	137.25	3.56	80.10
23 " 0 "	4.88	112.24	28.06	140.30	3.56	81.88
23 " 6 "	4.88	114.68	28.67	143.35	3.56	83.66
24 " 0 "	4.88	117.12	29.28	146.40	3.56	85.44
24 " 6 "	4.88	119.56	29.89	149.45	3.56	87.22
25 " 0 "	4.88	122.00	30.50	152.50	3.56	89.00
25 " 6 "	4.88	124.44	31.11	155.55	3.56	90.78
26 " 0 "	4.88	126.88	31.72	158.60	3.56	92.56
26 " 6 "	4.88	129.32	32.33	161.65	3.56	94.34
27 " 0 "	4.88	131.76	32.94	164.70	3.56	96.12
27 " 6 "	4.88	134.20	33.55	167.75	3.56	97.90
28 " 0 "	4.88	136.64	34.16	170.80	3.56	99.68

From November 1 to April 1.—A vessel entering the port of New York by the way of Sandy Hook during this season adds four dollars to the amount set opposite her draft, in column marked "Pilotage," in the foregoing table. If subject to offshore pilotage, by agreement, four dollars is added to the amount set opposite her draft, in the column marked "Total." Outward bound—add four dollars to the amount set opposite draft of vessel, in the column marked "Outward Pilotage."

HARBOR CONTROL, ETC., PORT OF NEW YORK.

Act passed by the Congress of the United States.

AN ACT to prevent obstructive and injurious deposits within the harbor and adjacent waters of New York City, by dumping or otherwise, and to punish and prevent such offenses.

Be it enacted by the Senate and House of Representatives of the United States of America in Congress assembled, That the placing, discharging, or depositing, by any process or in any manner, of refuse, dirt, ashes, cinders, mud, sand, dredgings, sludge, acid, or any other matter of any kind other than that flowing from streets, sewers, and passing therefrom in a liquid state, in the tidal waters of the harbor of New York, or its adjacent or tributary waters, or in those of Long Island Sound, within the limits which shall be prescribed by the

supervisor of the harbor, is hereby strictly forbidden, and every such act is made a misdemeanor, and every person engaged in or who shall aid, abet, authorize, or instigate a violation of this section, shall, upon conviction, be punishable by fine or imprisonment, or both, such fine to be not less than two hundred and fifty dollars nor more than two thousand five hundred dollars, and the imprisonment to be not less than thirty days nor more than one year, either or both united, as the judge before whom conviction is obtained shall decide, one half of said fine to be paid to the person or persons giving information which shall lead to conviction of this misdemeanor.

Sec. 4. That all mud, dirt, sand, dredgings, and material of every kind and description whatever, taken, dredged, or excavated from any slip, basin, or shoal in the harbor of New York, or the waters adjacent or tributary thereto, and placed on any boat, scow, or vessel for the purpose of being taken or towed upon the waters of the harbor of New York to a place of deposit, shall be deposited and discharged at such place or within such limits as shall be defined and specified by the supervisor of the harbor. * * * *

RULES AND REGULATIONS ESTABLISHED BY THE BOARD OF THE DEPARTMENT OF DOCKS, AND PUBLISHED MAY 1, 1882.

(*Extracts.*)

No. 3.—No cargo shall be discharged from any vessel upon any bulkhead or wharf structure, at which such vessel is being unladen, after service by the Corporation Wharfinger for the District, upon the owner, consignee, master, or other officer or stevedore, of such vessel, of a notice that such bulkhead or structure will be endangered by the placing of additional cargo thereon under a penalty of two hundred and fifty dollars for every such offense, and a further penalty equal in amount to the damages of every description which shall be caused by the further discharging of cargo upon such bulkhead or wharf structure, after the service of the said notice, both of such penalties to be recovered from such owner, consignee, master, or other officer, or stevedore, severally and respectively.

No. 4.—All goods, merchandise, and materials of every kind, landed or placed on any pier, bulkhead, or other wharf structure, or upon reclaimed land, must be removed therefrom without unnecessary delay, and within twenty-four hours after the Corporation Wharfinger for the District shall have served upon the owner, shipper, or consignee of such cargo a notice to remove the same, under a penalty of fifty dollars per day for each and every day, during which any part of said cargo shall remain upon such pier, bulkhead, structure, or land, after the expiration of the said twenty-four hours, to be recovered from such owner, shipper, or consignee, severally and respectively.

No. 7.—No vessel of any kind shall be loaded or discharged by horse power, nor shall stones or similar cargo be discharged from any vessel, upon any pier, bulkhead, or other wharf structure unless proper planking be provided to protect the surface of such pier, bulkhead, or other wharf structure from injury consequent upon the travel of the horse, or the throwing of the stones or similar cargo thereupon, under a penalty of five dollars a day for each horse so employed, and of twenty-five dollars for each offense of discharging such stones or like cargo, upon such pier, bulkhead, or other wharf structure, to be recovered from the owner, consignee, master, or stevedore of any such vessel, severally and respectively; and if such penalty be recovered for using horses, or discharging stones or similar cargo, upon wharf property belonging to the Corporation, under lease, it shall be paid to the lessee thereof, but if such penalty be recovered for using horses, or discharging stones or similar cargo upon wharf property, not owned by the Corporation, it shall be paid to the owner thereof.

No. 8.—No sand shall be discharged from any vessel unless canvas or similar material be extended from the vessel's side to the bulkhead or wharf structure at which such vessel is being unladened, to prevent the falling of the sand into the water, and if the surface of any such wharf structure is not sufficiently tight to prevent the sand dumped thereon from going through into the water, then no sand shall be discharged thereon from any vessel, unless canvas or similar material be first laid thereon to receive the sand, under a penalty of twenty-five dollars for each offense, to be recovered from the owner, consignee, master, or stevedore of any such vessel, severally and respectively; and if such penalty be recovered on account of sand discharged upon wharf property belonging to the Corporation, under lease, it shall be paid to the lessee thereof, but if such penalty be recovered on account of sand discharged upon wharf property not owned by the Corporation, it shall be paid to the owner thereof.

No. 10.—No ashes, refuse, offal, fruit, vegetables, or any other substances shall be thrown into the water surrounding or adjacent to any pier or bulkhead, or any other part of the water front of the city, under a penalty of twenty-five dollars for every such offense. * * * * *

No. 12.—All lumber, brick, or other material in bulk, discharged on any bulkhead not shedded, shall be at once removed, or, if not so removed, shall be placed at least twenty feet

ANCHORAGE GROUND
PORT OF NEW YORK
HUDSON AND EAST RIVERS

Scale: $\frac{1}{120\,000}$

Nautical Miles
1 ½ 0 1 2 3

Yards
1000 0 1000 2000 3000 4000 5000

Electric Cables shown thus
Water Pipe Lines " "
Anchorage Ground " "

1901

Prepared at the Office of the U. S. Coast and Geodetic Survey.

CHAPEL HILL BEACON

Hoe of the U. S. Coast and Geodetic Survey.

from the edge of the bulkhead, pending removal, under a penalty of fifty dollars per day, for each and every day such lumber, brick, or other material shall remain on the bulkhead. * * * * *

ANCHORAGE LIMITS, PORT OF NEW YORK.

Act passed by the Congress of the United States.

AN ACT relating to the anchorage of vessels in the port of New York.

Be it enacted by the Senate and House of Representatives of the United States of America in Congress assembled, That the Secretary of the Treasury is authorized, empowered, and directed to define and establish an anchorage ground for vessels in the bay and harbor of New York, and in the Hudson and East Rivers, to adopt suitable rules and regulations in relation thereto, and to take all necessary measures for the proper enforcement of such rules and regulations.

SEC. 2. That in the event of the violation of any such rules or regulations by the owner, master, or person in charge of any vessel, such owner, master, or person in charge of such vessel shall be liable to a penalty of one hundred dollars, and the said vessel may be holden for the payment of such penalty, and may be seized and proceeded against summarily by libel for the recovery of the same in any United States district court for the district within which such vessel may be, and in the name of the officer designated by the Secretary of the Treasury.

SEC. 3. That this act shall take effect immediately.

Approved, May 16, 1888.

The following are the rules, regulations, and the anchorage limits prescribed by the Secretary of the Treasury:

Vessels shall anchor only within the following specified limits:

EAST RIVER ANCHORAGES.

1. To the northward of a line from the south point of Hart Island to Wrights Point.
2. To the westward of a line from Wrights Point to Throgs Neck.
3. To the southward of a line from buoy off Sands Point to buoy off Gangway Rock.
4. To the southward of a line from buoy off Gangway Rock to center of Stepping Stones Lighthouse.
5. To the eastward of a line from the center of Stepping Stones Lighthouse to Willets Point.
6. On Hammond Flats, to the northward of a line from Throgs Neck to Old Ferry Point.
7. To the southward of a line from Willets Point to Whitestone Point.
8. On the north side of the channel, north of a line between Old Ferry Point and Hunts Point.
9. On the south side of the channel, south of a line between Whitestone Point and buoy (No. 1) off College Point, and to the eastward of a line running from said buoy to College Point.
10. In Flushing Bay, to the southward of a line from College Point to the north end of Rikers Island.
11. To the southward of a line from the north end of Rikers Island to the north end of South Brother Island, thence to Lawrences Point.
12. To the westward of a line from Stony Point to northeast end of Wards Island; and between Wards Island and Randalls Island, and between Randalls Island and Port Morris.
13. To the westward of a line from the foot of One hundred and sixteenth street, New York, to the north end of Avenue B, New York; but no vessel shall anchor on this anchorage within 150 feet of any wharf or pier, or so as to impede the movements of a ferry, or so as to prevent ready access to or from the piers.
14. To the eastward of a line from Hatters Dock to Gibbs Point (Hallets Cove, Astoria).
15. To the southward of Thirty-first street and northward of Twenty-first street piers, and to the westward of a line passing through buoy No. 1, off Thirty-fourth street, and danger buoy, off Twentieth street. Small vessels of the United States Government and vessels carrying a distinctive signal prescribed by the Secretary of the Navy may anchor anywhere within these limits, provided they do not obstruct the approach to any pier or impede the movements of any ferryboat; and the officer in charge of anchorage grounds may, whenever he deems advisable, move or cause to move any vessel not, in his opinion, complying with this proviso.

HUDSON RIVER ANCHORAGES.

16. Vessels may anchor in the Hudson River to the westward of the center line of said river running NE. ⅝ N. (correct magnetic) from Castle Point, and above Fourteenth street, Hoboken Ferry Landing; provided that in no case shall a vessel anchor within 200

yards of the shore or in such position as to impede the movements of a ferry or to prevent ready access to or from a pier. A line of three white buoys marks the east limit of this anchorage ground.

WESTERN ANCHORAGE, UPPER BAY.

17. To the southward of the range passing through Wall Street Ferry, Brooklyn, and the white buoy to the north and east of Ellis Island, to the westward of a line running SW. by S. (nearly) from the said white buoy to the white buoy south of Bedloes Island and the white buoy $\frac{1}{2}$ mile east from Robbins Reef Lighthouse, and to the northward of a line from Constables Point, through Robbins Reef Lighthouse, to the last-mentioned white buoy; provided that no vessel anchors in Ellis Island Channel or so as to obstruct the approaches to any pier within these limits.

GOVERNORS ISLAND ANCHORAGE.

18. To the southward of Governors Island, within the triangular space included in lines running from Castle William to buoy No. 1, thence to buoy No. 3 in Buttermilk Channel.

EASTERN ANCHORAGES, UPPER AND LOWER BAYS.

19. To the southward of a line passing through the Statue of Liberty on Bedloes Island, the two white buoys marking north limit of anchorage ground and the southern point of the north entrance to the Erie Basin; to the eastward of a range passing through Produce Exchange Tower, the east edge of Castle William, the white buoy marking north limit of anchorage ground, and buoys No. 14 and bell buoy off Owls Head; and to the eastward of a range passing through bell buoy off Owls Head, the western edge of Long Island in the Narrows, and eastern side of Fort Lafayette as far south as the East Channel, between buoys Nos. 4 and 6; provided that no vessel shall anchor within 300 yards of the Erie Basin, and that no vessel shall anchor so as to impede the movements of a ferry or so as to prevent ready access to or from the piers.

20. Vessels may anchor on Dry Romer shoal and Flynns Knoll.

STATEN ISLAND ANCHORAGE.

21. To the southward of a line from St. Georges Ferry Landing, Staten Island, to the white buoy off St. Georges Landing and the railroad terminal docks at Bay Ridge, Long Island, and to the westward of a line running S. $\frac{5}{8}$ W. (nearly) from the white buoy off St. Georges Landing, through the white buoys off Tomkinsville and Stapleton, Staten Island. To the westward of a line running SSE. $\frac{1}{4}$ S. (nearly) from Fort Tompkins to the buoy on Cravens Shoal, thence to buoys Nos. 11, 9, and 7, thence to Conovers Beacon; but in no case shall a vessel anchor so as to impede the movements of any ferry or prevent ready access to or from any pier.

The part of anchorage 21 lying between its northern boundary and the white buoy 800 yards south of said boundary is reserved for ships of war of all nations and vessels of the United States Government.

[NOTE.—Vessels detained at upper quarantine may anchor between Fort Tompkins Light and Quarantine Wharf at Clifton, Staten Island.]

SANDY HOOK BAY ANCHORAGE.

22. To the southward of a line extending from East Beacon to Bayside Beacon (Point Comfort), provided they do not impede the movements of vessels in getting to and from the piers. In order to prevent injury to the submarine cables, vessels are forbidden to anchor when the East Beacon Lighthouse bears anywhere between the compass bearings of WSW. $\frac{1}{2}$ W. and SW. by W. $\frac{3}{4}$ W. from the vessel, unless the said vessel is to the northward of the northern line of buoys of Gedneys Channel. No vessel shall anchor in any of the following channels: Gedneys Channel, Main Channel, Swash Channel, and East Channel, excepting in cases of great emergency, and then outside of the channels as marked by the buoys, and only until such time as they can procure assistance.

23. Vessels carrying gunpowder or other explosives may anchor only as follows:

First.—On the shoal ground to the eastward of Rickers Island, East River, from $\frac{1}{4}$ to $\frac{5}{8}$ of a mile from this island.

Second.—On Jersey Flats, to the westward of a line running NE. by N. from the outer end of the pier, east of Black Tom Island; provided that such vessels do not anchor within 800 yards of Ellis Island or within 500 yards of any pier.

Third.—On the flats to the south of a line drawn from Bedloes Island to Cavens Point, New Jersey, and the westward of a line from Bedloes Island to Robbins Reef; provided that they do not anchor within 1,000 yards of either Bedloes Island or Robbins Reef Light or within 500 yards of any pier. Vessels (carrying explosives) of too great draft to use this anchorage may anchor only in Gravesend Bay, but not within 1,000 yards of the shore.

All vessels laden with explosives while within the port will display at all times a red flag of at least 16 square feet surface at the masthead. Vessels so laden and without masts will display the flag at least 10 feet above the uppermost deck. Points where cables and water pipes cross are clearly marked in red on the accompanying map, and all vessels are cautioned not to anchor so as to interfere with them.

Ash scows, the property of the municipalities bordering on the waters of the port, may be anchored in such places as the supervisor of anchorages may designate.

The white mooring buoys off the upper Quarantine Station, in the Narrows, are exclusively for the use of vessels awaiting the first visit of the health officer, and are not to be occupied at any other time.

All officers of revenue vessels at the port of New York are charged with the enforcement of these rules and regulations, and are empowered to remove from her anchorage any vessel not anchored within the prescribed limits.

QUARANTINE LAWS OF THE PORT OF NEW YORK.

Extracts from Article VI, Chapter 661, of the Laws of New York, 1893.

ANCHORAGE.

Sec. 86. The anchorage for vessels under quarantine shall be in the Lower Bay, distant not less than two miles from the nearest shore, and within an area to be designated by buoys by the Quarantine Commissioners and Health Officer. The quarantine ship shall be anchored in the Lower Bay whenever in the judgment of the Health Officer it is necessary for the protection of the public health. At other times it may be moored at such place as he may direct.

BOARDING STATION.

Sec. 87. The boarding station for vessels from any place where disease subject to quarantine existed at the time of their departure, or which shall have stopped at any such place on their voyage, or on board of which during the voyage any case of such disease shall have occurred, arriving between the first day of April and the first day of November, shall be at such place as the Health Officer and Quarantine Commissioners may designate. And all such vessels, immediately on their arrival, shall anchor near such boarding station and there remain with all persons arriving thereon until discharged by the Health Officer.

BOARDING VESSELS.

Sec. 104. The Health Officer shall board every quarantinable vessel as soon after her arrival as practicable, between sunrise and sunset * * * . *See also section 120 of this act.*

BILLS OF HEALTH.

Sec. 105. The Health Officer shall require the masters of all merchant ships and vessels arriving at such port from any foreign port to present a bill of health, duly executed * * * at such port of departure.† * * * Vessels touching at other ports on the passage shall also bring a bill of health from each such port, or shall have endorsed on the original bill of health by one of such United States officers thereat. * * *

QUARANTINABLE DISEASES.

Sec. 109. The quarantinable diseases are yellow fever, cholera, typhus or ship fever, smallpox, scarlet fever, diphtheria, measles, and relapsing fever, and any other disease of a contagious, infections or pestilential nature, which has been or may be determined to be quarantinable by the Health Officer. Persons with insufficient evidence of effective vaccination, and known to have been recently exposed to smallpox, shall be vaccinated as soon as practicable, and detained until the vaccinia shall have taken effect. * * *

QUARANTINABLE VESSELS AND PERIOD OF QUARANTINE.

Sec. 110. Every vessel arriving at the port of New York from any place where a quarantinable disease existed at the time of departure, or which shall have arrived at any such place and proceeded therefrom to New York, or on board of which during the voyage any cases of any such disease shall have occurred, shall remain at quarantine until the Health Officer grant a permit for the discharge of such vessel or cargo, or both. Every vessel arriving at the Port of New York from any foreign port, and every vessel from a domestic port (in the ordinary passage from which they pass south of Cape Henlopen, arriving between the first day of May and the first day of November), shall, on their arrival at the quarantine grounds, be subject to visitation by the Health Officer, but shall not be detained beyond the time

† Under heading "National Quarantines" see sections 2 and 5 of "An Act granting additional quarantine powers, etc." Approved February 15, 1893.

requisite for due examination and observation, unless they have had on board, during the voyage, some case of quarantinable disease, in which case they shall be subject to such regulations as the Health Officer may prescribe. No vessel shall be put in quarantine without a written decision of the Health Officer, of which the captain or master shall be immediately informed. No quarantinable vessel shall depart from quarantine without the written permission of the Health Officer, which shall be delivered by the master of the vessel to the board of health of the city of New York, or the health commissioner of the city of Brooklyn, according to the destination of the vessel, within twenty-four hours after the permit is received by him.

Sec. 112. If a vessel which has not had, during the voyage, a case of quarantinable disease, is found in a condition which the Health Officer deems dangerous to the public health, the vessel and its cargo shall be detained until the case can be considered, but the decision of the Health Officer shall be rendered within twenty-four hours. Any vessel in an unhealthy state, whether it has sickness on board or not, shall not be allowed pratique until it shall have been broken out, duly cleansed and ventilated.

Sec. 115. The Health Officer shall cause all vessels * * * in quarantine to be designated by a yellow flag, and shall prohibit communication with or passage within range of the same, except under such restrictions as he may designate compatible with the public safety.

WHEN VESSEL MAY RETURN TO SEA WITHOUT QUARANTINE.

Sec. 111. A vessel may, before breaking bulk, put to sea in preference to being quarantined, if the Health Officer is satisfied that its sick will be taken care of for the remainder of the voyage, and its bill of health shall be returned if it has not arrived at its port of destination. The Health Officer shall state on such bill of health the length and circumstance of its detention and its condition on reputting to sea and shall take care of such of its sick as prefer to remain.

WHEN MASTER OF VESSEL MUST PROVIDE FOR PASSENGERS.

Sec. 127. All passengers on board any vessel under quarantine shall be provided for by the master of the vessel on which they arrive. If the master neglects or refuses to provide for them, or if they have been sent on shore by the Health Officer, they shall be maintained by the quarantine commissioners at the expense of the vessel.

FEES AND COMPENSATION OF HEALTH OFFICERS.

Sec. 120. The Health Officer shall receive fees for his services at not exceeding the following rates namely: For inspection of any vessel from a foreign port five dollars. For inspection of every vessel from a domestic port, south of Cape Henlopen, between May first and November first, in each year, steamers three dollars, other vessels one dollar. For medical inspection of every one hundred or fraction of one hundred steerage passengers upon transatlantic steamers two dollars. For each special permit issued for the discharge of cargo, portion of cargo, or baggage brought as freight twenty-five cents. For sanitary inspection of every vessel after discharge of cargo or ballast ten dollars. For fumigation and disinfection of every vessel five dollars. But no more than two fumigations or disinfections shall be charged for any one vessel during a single quarantine. For boarding every vessel and giving a permit, between sunset and sunrise, at the request of the owner, consignee or master of the vessel, when such pratique can be given without danger to the public health five dollars. For vaccination of persons on vessels * * * each twenty-five cents. But no charge shall be made for the vaccination of any person who shall have been successfully vaccinated by the medical officer of the ship.

LIEN FOR SERVICES AND EXPENSES.

Sec. 123. All such expenses, services, and charges shall be a lien on the vessels, merchandise or other property in relation to which they shall have been made, incurred, or rendered, and if such master, owner or consignee shall omit to pay the same within three days after the presentation of such account, the commissioners may proceed to enforce such lien in the manner provided in the lien law for the enforcement of liens upon vessels; * * * .

Extracts from Act of April 29, 1863.

DUTIES AND LIABILITIES OF MASTERS OF VESSELS.

Sec. 32. Every master of a vessel subject to visitation by the Health Officer, who shall refuse or neglect either:

1. To proceed with and anchor his vessel at the place assigned at the time of his arrival; or
2. To submit his vessel, cargo, crew, and passengers to the examination of the Health Officer, and to furnish all necessary information to enable that officer to determine to what measures they ought respectively to be subject; or

3. To remain with his vessel at quarantine during the period assigned by the Health Officer, and while at quarantine, to comply with the directions and regulations prescribed by law, and with such as any of the officers of health, by virtue of the authority given to them by law, shall prescribe in relation to his vessel, his cargo, himself, his crew or passengers;—shall be guilty of a misdemeanor, and be punished by a fine not exceeding two thousand dollars, or by imprisonment not exceeding twelve months, or both, by such fine and imprisonment.

Sec. 33. Every master of a vessel hailed by a pilot, who shall either:

1. Give false information to such pilot, relative to the condition of his vessel, crew, or passengers, or the health of the place or places from whence he came, or refuse to give such information as shall be lawfully required;

2. Or land any person from his vessel, or permit any person, except a pilot, to come on board of his vessel, or unlade or transship any portion of his cargo before his vessel shall have been visited and examined by the Health Officer.

3. Or shall approach with his vessel nearer to the city of New York or Brooklyn than the place of boarding or anchorage to which he may be directed; shall be guilty of a like offense and be subject to the like punishment; and any person who shall land from any vessel, or unlade or transship any portion of her cargo under like circumstances, shall be guilty of the like offense and subject to the like punishment.

SANITARY CODE OF THE BOARD OF HEALTH.

Extracts from pamphlet edition of the code, issued November, 1885.

REPORTS AS TO CONTAGIOUS AND INFECTIOUS DISEASES.

Sec. 135. That the master, chief officer, and consignee, or one of them, of every vessel not being in quarantine, or within quarantine limits, but being within one-fourth of a mile of any dock, wharf, pier, or building of said city, shall daily report to the Sanitary Bureau, or cause to be reported, in writing, the particulars, and shall therein state the name, disease, and condition of any person being in or on such vessel, and sick of any contagious disease.*

Sec. 138. That every master and chief officer of any vessel, and every physician of, or who practiced on, any vessel which shall arrive in the port of New York from any other port, shall at once report to this Department any facts connected with any person or thing on said vessel, or that came thereon, which he has reason to think may endanger the public health of the city; and he shall report the facts as to any person being or having been sick thereon, of a contagious disease, and as to their being or having been, during the voyage or since her arrival, any infected persons or articles thereon.

Sec. 139. That every master, charterer, owner, part owner, and consignee of any vessel or of the cargo thereof which shall be in the water of said city, unless detained in quarantine, shall at once give or cause to be given, to the Sanitary Superintendent, written notice of any infected article or person, and of every person sick of a contagious disease, being or having within ten days been on board said vessel; and also of each and every fact and thing relative to said vessel, sick person, or cargo, or to the crew of such a vessel, which any of the first-mentioned persons shall have reason to think may be useful for this Department to know, or be or become dangerous or prejudicial to life or health in said city.

REMOVALS FROM AND UNLOADING OF VESSELS.

Sec. 140. That every master, owner, part owner, charterer, or consignee of any vessel, that shall bring any cotton into the port of New York, between the first day of May and the first day of November of each year, shall at once report to this Department, or cause to be made in writing, a report to this Department of the fact of any such cotton being in a dangerous, infected, or unsound condition, or having been exposed to an infection.

Sec. 141. That no master, charterer, owner, part owner, or consignee of any vessel, or any other person, shall bring to any dock, pier, wharf, or building within one thousand feet thereof, in said city, or unload at any dock, building, or pier therein, or have on storage in the built-up portions of said city, any skins, hides, rags, or similar articles of materials, having been brought from any foreign country or infected place, or from any points south of Norfolk, Virginia, without or otherwise than according to written permit so to do from the Department; and no person shall sell, exchange, or in any way make exposure of straw, bedding, or other articles that have been exposed to the contagion or infection of any contagious disease, or have been or are liable to communicate such disease, or have lately been on any emigrant vessel, until after the same have been adequately cleansed or disinfected.

* The Sanitary Bureau is at No. 301 Mott street, New York City; many of its routine duties are under the charge of the Sanitary Superintendent. This Department should not be confused with the Quarantine service, the headquarters of which are at Southfield, Staten Island, just above The Narrows. The official who has immediate charge of the Quarantine inspection is the Health Officer of the port.

Sec. 142. That no owner, agent, or consignee of any vessel, or cargo, and no officer of any vessel (in respect of either of which vessel or cargo a permit, according to any law, ordinance, or regulation shall or should have been obtained to pass quarantine, or to come up to the water front of the city of New York) shall unlade, or land, or cause to be unladen or landed such cargo, or any part thereof, in said city, without having first received the written permit of this Department so to do.

Sec. 143. That no captain, officer, consignee, owner, or other person in charge of any vessel (or having right and authority to prevent the same) shall remove or aid in removing from any vessel to the shore (save as legally authorized by the Health Officer of the port of New York, and into quarantine grounds and buildings only) any person sick of, or person that has been exposed to, and is liable very soon to develop, any contagious disease, nor so remove or aid in removing any articles that may have been exposed to the contagion of any such disease, except in accordance with a permit of this Department, or with its special regulations.

Sec. 144. That no master, charterer, consignee, or other person shall order, bring, or allow (having power and authority to prevent) any vessel or person, or article therefrom, from any infected port, nor any vessel or person, or article therefrom, liable to quarantine, according to the ninth section of the three hundred and fifty-eighth chapter of the Laws of 1863 (or under any other laws, and whether such quarantine has been made or suffered or not), to come or to be brought to any point nearer than three hundred yards of any dock or pier, or to any building in said city without or otherwise than according to a permit of this Department. Nor shall any vessel, or person or thing therein or therefrom, having been in quarantine, come or be brought within the last named distance of any last named place, without the permit or assent of this Department.

Sec. 145. That no person shall bring into this city from any infected place, or land or take therein, from any vessel lately from an infected port, or from any vessel or building in which had lately been any person sick of a contagious disease, any article or person whatsoever, nor shall any such person land or come into said city without a permit of this Department; and it shall be no excuse that such person or article so offending, or the occasion of offense, has passed through quarantine, or has a permit from any other source than this Department.

Sec. 146. That no owner, part owner, charterer, agent or consignee of any vessel, nor any officer or person having charge or control of the same, shall allow to be cast therefrom, and no person shall cast therefrom, into any public waters of the city of New York, any straw, bedding, clothing, or other substance, from any incoming vessel, from any foreign port, or port south of Cape Henlopen, without a permit from this Board, except as allowed by the quarantine authorities.

NEW JERSEY.

PILOT LAWS.

Extracts from the Revised Statutes of New Jersey, 1709–1887.

New Jersey coasting vessels not required to employ licensed pilot.

48. Sec. 1. That henceforth no citizen of New Jersey, being master of any vessel navigated under a coasting license, employed in the coasting trade, and whose vessel shall be bound either in or out of any of the navigable waters of the State of New Jersey, or over which the said State has concurrent jurisdiction with other States, constituting waters wherein pilotage is usually charged, demanded, or received, whether the same be in or out of the capes of the Delaware, or in the Delaware bay or river, or in or over the bar of Sandy Hook, shall be required to employ a licensed pilot.

Master refusing pilot to pay half pilotage.

Sec. 17. That if the master of any vessel (except schooners and sloops employed in the coasting trade licensed for that purpose, and not making the usual signal for a pilot), coming into the ports of Jersey City, Newark, and Perth Amboy, or into any of the waters of New Jersey, shall refuse to receive on board and employ a pilot who shall have offered to go on board and to take charge of the pilotage of such vessel, the master, owner, or consignee of such vessel shall pay to the pilot half pilotage, from the place at which such pilot shall have offered himself to the port of destination; but no half pilotage shall be collected from any vessel in charge of a New York pilot.

Fees for pilotage.

29. Sec. 2. * * * *and be it further enacted*, that if changes take place in the rates of pilotage of the New York pilots, that then the rates of pilotage for New Jersey pilots shall be made to conform to such changes,

by the commissioners of pilotage for New Jersey, on their being made duly cognizant thereof.†

16. Sec. 10. That every pilot or deputy pilot who shall have exerted himself for the preservation of any vessel appearing to be in distress and in want of a pilot, shall be entitled for any extraordinary services to such sum as the pilot and master, owner or consignee can agree on, or in case of not agreeing, as the commissioners shall determine to be a reasonable reward. Fees for extra services.

28. Sec. 1. That a pilot who is carried to sea, when a boat is attending to receive him, shall receive at the rate of one hundred dollars per month, and his reasonable expenses, during his necessary absence. Pay of pilot carried to sea.

32. Sec. 5. That for every day of detention at the wharf, or in the harbor, beyond the time notified to the pilot, for him to attend the vessel, or beyond the usual time of getting vessels from sea to the wharf, and from the wharf to the sea, and for every day of detention of an inward bound vessel by ice, longer than two days for the passage from sea to the wharf, three dollars shall be added to the pilotage; if any pilot shall be detained at quarantine by the health officer, for having been on board a sickly vessel as pilot, the master, owner, agent, or consignee of said vessel shall pay to such pilot all necessary expenses of living, and three dollars per day for each and every day of such detention. Fees for detention at wharf.

NOTE.—*The by-laws of the New Jersey Board of Pilot Commissioners embody sections 8 to 34, both inclusive, of the by-laws of the Board of Commissioners of Pilots, for New York given on pages 85, 86.*

HARBOR MASTERS AND HARBOR CONTROL.

Extracts from the Revised Statutes of New Jersey, 1709–1887.

An act to appoint harbor masters and inspectors:‡ *31. Sec. 1.* * * * and such harbor masters shall have authority to regulate and station all ships and vessels in the bay of New York, § or in the North River within the limits of Hudson County and the wharves thereof, and to remove from time to time such ships and vessels as are not employed in receiving and discharging their cargoes, to make room for such others as require to be more immediately accommodated, for the purpose of receiving and discharging cargoes; as to the fact of their being fairly and *bona fide* employed in receiving and discharging their cargoes, the said harbor masters, or either of them is hereby constituted the sole judge; * * * * * and if any master or other person, having charge of any ship or vessel, shall refuse or neglect to obey the directions of the said harbor masters, or either of them, in matters within their authority to direct, or if any person shall resist or oppose the said harbor masters, or either of them, in the execution of the duties of their office, such master or other persons having charge of any ship or vessel, or other person whatsoever, shall for every such offense, forfeit and pay the sum of fifty dollars * * * * * and the said harbor masters shall have power to demand and receive from the commanders, owners, and consignees, or either of them, on all ships or vessels of the United States and on all ships or vessels of any foreign nation that are permitted by the laws of the United States to enter on the same terms as vessels of the United States, and which shall enter the bay of New York or in the North River, within the limits of Hudson County aforesaid, and load or unload, or make fast to any wharf therein, one-half of one percentum per ton to be computed from the tonnage expressed in the register or enrollment of such ships and vessels, respectively, and no more; and also on all other foreign ships or vessels which shall arrive and enter the said port, and load, unload, or make fast to any wharf therein, double the amount of fees above specified, according to the rate of tonnage or burthen of said ships or vessels, respectively, to be ascertained by their respective registers or other documents on board the same, but no compensation shall be demanded by the said harbor masters for the entrance into the said limits of Hudson County, any ship or schooner employed in the coasting trade within the United States, unless upon application of the master or person having charge of such vessel employed in the coasting trade as aforesaid; * * * * * the master, owner, and consignees of any ship or vessel subject to the payment Powers of harbor masters.

† *For rates of pilotage see:* Table and paragraph following on page 87. Sections 21, 22, and 24, on pages 85, 86. Sections 2107 and 2108 on page 84.

‡ "An Act to provide for the appointment of a harbor master for the harbor of Elizabeth and Elizabeth Creek in this State" is practically the same.

§ See also an "Act passed by the Congress of the United States" on page 89.

of the fees to harbor masters as aforesaid shall within forty-eight hours after the arrival of such ship or vessel, pay the fees so due thereon, at the office of the said harbor masters, or one of them, * * * * * said harbor masters whenever required by the captain, owner, or consignee of any vessel, to give a copy of this act to such captain, owner, or consignee, and no person shall be fined for a violation of this act until that has been done; * * * * *

Vessels sailing in the Raritan and Staten Island Sound to keep to the right.

An act to regulate the navigation of the river Raritan and Staten Island Sound: *14. Sec. 1.* That all captains, owners, or other persons in charge of vessels in the river Raritan and sound between this State and Staten Island, sailing with a fair or free wind, when met by another vessel, shall keep to the right, and when overtaken by another vessel they shall likewise keep to the right.

Vessels at anchor at night in said river and sound to keep light hoisted.

15. Sec. 2. That all captains, owners, or other persons in charge of vessels navigating the river Raritan and sound between this State and Staten Island, when they shall come to anchor at night, shall keep or cause to be kept a lantern lighted, or other light that may be seen, hoisted at least twenty feet above the deck of such vessel.

Rate of speed of steamboats on Raritan River.

An act to regulate the speed of steamboats, and other vessels propelled by steam, on the Raritan River: *17. Sec. 1.* That it shall not be lawful for any steamboat, or other vessel propelled by steam, to pass any of the wharves on either side of the Raritan River, between New Brunswick and a point two hundred yards below French's or Wood's Landing, at a greater speed than four miles per hour while any vessel is laying thereto, nor pass up and down the said river between said points at a greater speed than seven miles per hour.†

Vessels may not come to anchor in the channel of the bay.

An act to regulate the navigation of Raritan Bay: *19. Sec. 1.* That it shall not be lawful for any captain, owner, or other person or persons in charge of vessels navigating that part of Raritan Bay northwesterly from Keyport dock, in Monmouth County, for the distance of six hundred yards, knowingly and willfully to come to or lay at anchor in the channel of said bay, between the limits aforesaid, and hereafter defined.

Width of the channel.

20. Sec. 2. That said channel shall be and is hereby declared to be three hundred feet in width, and shall be marked by stakes or buoys in the middle or on either side of said channel before any penalty or damages can be recovered as hereinafter provided.‡

Unlawful to place, deposit, or throw refuse, etc., in certain navigable waters, etc., in this State.

An act to protect the navigable waters * * * over which the State of New Jersey may have jurisdiction: *5. Sec. 1.* That it shall be unlawful for any person or persons to throw, place, or deposit in any way or manner, or cause to be thrown, placed, or deposited in any way or manner into or upon the navigable waters of the Kill Von Kull, Arthur Kill, or Staten Island Sounds, Newark Bay or tributaries, Raritan Bay or tributaries, New York Bay and Harbor, or the Hudson River, within the jurisdiction of the State of New Jersey, or over which this State may have jurisdiction, any dredgings, mud, ashes, cinders, shells, refuse, or any other solid material of any kind or description whatever, unless duly authorized so to do under the laws of this State or of the United States; * * * * *

Penalty for violating this act.

6. Sec. 2. That any person or persons violating any of the provisions of the first section of this act shall be deemed guilty of a misdemeanor, and, upon conviction thereof before any court of competent jurisdiction, in any county bordering on said waters, within which such violation may have occurred, shall for the first offense be punished by a fine not exceeding one hundred dollars, and for any succeeding offense by a fine not exceeding two hundred dollars and imprisonment in the county jail for a term not exceeding six months; said fines to be in addition to the cost of prosecution.

PENNSYLVANIA.

PILOT LAWS.

Extracts from Public Laws of Pennsylvania.

Act of March 29, 1803.

Sec. 21. That the pilot who shall first offer himself to any inward bound ship or vessel shall be entitled to take charge thereof: *Provided*, his license shall authorize him to pilot ships or vessels of such draft of water; and it

†Penalty for violating this section, one hundred dollars.

‡Penalty for violating this section, twenty dollars.

shall be the duty of such pilot, if required, to exhibit his license to the master or commander of such ship or vessel: * * *

Sec. 22. That it shall be the duty of every master or commander of a ship or vessel outward bound from the port of Philadelphia, and he is hereby required to remain twenty-four hours after his arrival at the Capes, to give to the pilot on board such ship or vessel an opportunity to be taken out; and if the master or commander of such ship or vessel refuses so to do, and if the same can be done without endangering the vessel aforesaid, the master, owner or consignee of such ship or vessel shall forfeit and pay to such pilot, his executors or administrators, any sum not exceeding eight hundred dollars. * * *

Sec. 23. That if it so happen that any first-rate pilot, having a boat attending him, shall be carried to sea in any ship or vessel contrary to his inclination, by stress of weather or other unavoidable accident, the master, owner, or consignee of such ship or vessel shall pay to such pilot, his executors, or administrators, the same wages as the master of said vessel receives, until the return of said pilot to the said Capes, or in case he shall die while so absent, then to the time of his death; and if any second-rate pilot shall be carried off as aforesaid, the same wages as the first mate of such vessel receives; * * * and if any pilot as aforesaid, not having a boat attending him shall be carried to sea as aforesaid, he shall be paid one-half the wages he would have been entitled to, had a boat been attending.

Sec. 24. That when any inward bound ship or vessel having a pilot on board, shall be prevented by the ice, or by any other cause, from proceeding to the port of Philadelphia, and shall be compelled to proceed to some other port or place not in the bay and river Delaware, the pilot shall be entitled to receive and recover from the owner or consignee of such ship or vessel full pilotage, as if he had conducted such ship or vessel to such ports, and shall also receive the sum of eight cents for each and every mile he shall travel to his usual place of abode.

Sec. 28. That the compensation to be paid to pilots for conducting to or from the city of Philadelphia all dismasted, or otherwise crippled vessel or vessels, which shall have been in anywise injured, so as to occasion to the said pilots any extraordinary care or trouble, shall not exceed double the amount what they otherwise would have been entitled to, of which the Board of Wardens shall judge.

Sec. 25. That there shall be allowed two dollars per day to every pilot of any ship or vessel compelled to perform quarantine, for every day he may be so detained. * * *

Act of May 20, 1864.

Sec. 5. That masters of vessels shall give an account to the pilot when boarding, of the draft of such vessel, and in case he shall misrepresent said draft, and give it at less than the actual draft, he shall forfeit and pay the sum of twenty-five dollars. * * *

Act of March 24, 1851.

Sec. 6. That all sums due for pilotage, half pilotage, and all other claims and penalties, in the nature or in lieu thereof, shall, as they accrue, become and remain a lien upon the vessel chargeable therewith, her tackle, apparel, and furniture, until they are paid; * * *

Further supplement to Act of March 29, 1803, approved May 11, 1889.

Sec. 1. That from and after the passage of this act the rates of pilotage for conducting a vessel from the capes of the Delaware to the city of Philadelphia or other place on the river Delaware, and from the city of Philadelphia or other place on the river Delaware to the capes of the Delaware, in either case shall be for every half foot of water which a vessel shall draw† * * * *Provided, always*, that a vessel inward bound to any port or place on the bay or river Delaware, which is not spoken or offered the services of a pilot outside of a straight line drawn from Cape Henlopen Light to Cape May Light, shall be exempt from the duty of taking a pilot, and the vessel as well as her master, owner, agent, or consignee shall be exempt from the duty of paying pilotage or half pilotage or any penalty whatsoever in case of her neglect or refusal to do so.

Sec. 2. That in case a pilot having charge of a vessel and whilst conducting said vessel be detained either by order of the master, owner, or consignee of the vessel, or by ice, or by any other unavoidable circumstance not personal to himself, the pilot shall receive compensation for such detention at the rate of three dollars per day for each and every day so detained, commencing at a period of twenty-four hours from the time the detention first occurred.

†See the table on page 99.

Sec. 3. That every ship or vessel bound to the Delaware breakwater for orders shall be obliged to receive a pilot provided she is spoken or a pilot offers his services outside of a straight line drawn from Cape Henlopen Light to Cape May Light, and every ship or vessel bound to the breakwater for orders shall pay pilotage fees as follows:† * * * and if such ship or vessel without discharging her pilot proceed to the port of Philadelphia or any other port or place on the bay or river Delaware, only one full pilotage fee is fixed by the first section of this act for the entire service in addition to the fee for detention. *Provided, however*, if the pilot bringing such ship or vessel to the breakwater be there discharged and the ship or vessel afterward proceed to Philadelphia or any other port or place on the bay or river Delaware, she shall make the usual signal for a pilot and continue to make such signal till reaching Brandywine Light, and if spoken by or offered the services of a duly licensed Pennsylvania pilot before reaching Brandywine Light shall be obliged to employ such pilot and pay him at the rate of one dollar and eighty-seven cents for every half foot of water she shall draw under, up to, and including twelve feet, and for every vessel drawing over twelve feet the sum of two dollars and twenty-five cents per half foot of water, which shall be in addition to the fees paid for bringing her into the breakwater and for detention, if any, such fees to be collected as other fees for pilotage are now collected.

Sec. 4. Vessels employed in and licensed for the coasting trade shall be exempt from the duty of employing a pilot, and the vessels as well as their masters, owners, agents or consignees shall be exempt from the duty of paying pilotage, half pilotage, or any penalty whatsoever in case of their neglect or refusal so to do, except ships or vessels under register bound to or from the States or Territories of the United States on the Pacific Ocean; but a coastwise vessel voluntarily taking a pilot shall pay the same fees for pilotage as prescribed in the case of a vessel bound to or from a foreign port.

Sec. 5. Any American vessel solely coal laden with coal mined in the United States shall be exempt from the duty of taking a pilot, and the vessel as well as her master, owner, agent or consignee shall be exempt from the duty of paying pilotage or half pilotage or any penalty whatsoever in case of his neglect or refusal so to do.

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† See the note under the table of Pilotage Rates for Delaware bay and river.

RATES OF PILOTAGE, DELAWARE BAY AND RIVER. (*See Supplement, Art. 36.*)

Approved by State of Pennsylvania May 11, 1889.
Passed by State of Delaware February 15, 1883, and April 25, 1889.

DRAFT, FEET.	INWARD.			OUTWARD.
	If spoken outside of a straight line Southward and Eastward of Fenwicks Island Lighthouse to Five-fathom Bank Light-ship, and Northward and Eastward from Five-fathom Bank Light-ship to Hereford Lighthouse.	If spoken inside a straight line Southward and Eastward of Fenwicks Island Lighthouse to Five-fathom Bank Light-ship, and Northward and Eastward from Five-fathom Bank Light-ship to Hereford Lighthouse, and outside of a straight line drawn from Cape Henlopen Light to Cape May Light.	If not spoken until inside of line drawn from Cape May Light to Cape Henlopen Light.	
8	32.88	29.92	26.96	29.92
8½	34.94	31.79	28.65	31.79
9	36.99	33.66	30.33	33.66
9½	39.05	35.53	32.00	35.53
10	41.10	37.40	33.70	37.40
10½	43.15	39.27	35.38	39.27
11	45.21	41.14	37.07	41.14
11½	47.27	43.01	38.75	43.01
12	49.32	44.88	40.44	44.88
12½	61.87	56.25	50.63	56.25
13	64.35	58.50	52.65	58.50
13½	66.82	60.75	54.68	60.75
14	69.30	63.00	56.70	63.00
14½	71.77	65.25	58.73	65.25
15	74.25	67.50	60.75	67.50
15½	76.72	69.75	62.78	69.75
16	79.20	72.00	64.80	72.00
16½	81.67	74.25	66.83	74.25
17	84.15	76.50	68.85	76.50
17½	86.62	78.75	70.88	78.75
18	89.10	81.00	72.90	81.00
18½	91.57	83.25	74.93	83.25
19	94.05	85.50	76.95	85.50
19½	96.52	87.75	78.98	87.75
20	99.00	90.00	81.00	90.00
20½	101.47	92.25	83.03	92.25
21	103.95	94.50	85.05	94.50
21½	106.42	96.75	87.08	96.75
22	108.90	99.00	89.10	99.00
22½	111.37	101.25	91.13	101.25
23	113.85	103.50	93.15	103.50
23½	116.32	105.75	95.18	105.75
24	118.80	108.00	97.20	108.00
24½	121.27	110.25	99.23	110.25
25	123.75	112.50	101.25	112.50
25½	126.22	114.75	103.28	114.75
26	128.70	117.00	105.30	117.00
26½	131.17	119.25	107.33	119.25
27	133.65	121.50	109.35	121.50

Rates for vessels calling at Delaware Breakwater for orders: Inward or outward, *one-half* the amount set opposite the draft in one of the columns above headed *inward*, the column depending on where the vessel is spoken by a pilot.

HARBOR CONTROL.

Sec. 147. That all vessels over seventy-five tons burthen, shall, within twenty-four hours after their arrival at the port of Philadelphia, report and register at the office of the Board of Wardens † for the said port. * * * Act of June 15, 1871.

Sec. 75. That if any person or persons whoever, shall, from and after the passage of this act, cast into the tideway of the river Delaware, or into the river Schuylkill, from the lower falls thereof to its junction with the river Delaware, any ballast, cinders, ashes, or any heavy article whatever, from any ship, vessel, steamboat, or wharf, he or they so offending, for every such offense, shall forfeit and pay a sum not exceeding one hundred dollars, * * *. Act of Feb. 4, 1846.

† The office of the Board of Wardens is Nos. 11 and 13, Chamber of Commerce, Philadelphia.

Extracts from Rules and Regulations of the Board of Wardens.

Sept. 4, 1876.

Resolved, That a licensed pilot who is in charge of a tug or wrecking boat shall not pilot vessels he may tow, in order to receive both pilotage and towage, unless he remains on board, in charge of said vessel in tow.

Extracts from Rules and Regulations Governing the Port of Philadelphia, in operation December, 1897. (*See Supplement, Art. 37.*)

2. Vessels must not anchor in the river Delaware below Kaighns Point, west of the buoys marking the main channel.

Vessels must not anchor above Kaighns Point, except in the east channel at Coopers Point.

Vessels must in no case anchor where they will interfere with the ferries.

Vessels must not anchor at Port Richmond, except by permission and under the direction of the harbor master.

Vessels must not anchor at any place in the channel of the river Schuylkill, or lie at any wharf in the river more than two abreast, without the permission of the harbor master.

Vessels must not anchor on the range line of any range lights.

Vessels at anchor must exhibit, between sunset and sunrise, a visible white signal light in the rigging, at least fifteen feet above the deck.

3. Vessels hauled into any wharf or dock, or alongside other vessels lying at any wharf or dock, must be made fast to the shore with proper lines, with sufficient fenders between them and the inside vessels, and shall, when so ordered by the harbor master, have their jib booms, sprit sail yards, main booms, spankers, ringtail booms, davits, and bumpkins, if any, rigged in, their lower yards topped, and anchors either a cockbill or at the hawse pipes, as most convenient.

4. When fasts of vessels extend across a dock so as to obstruct passing vessels, the captain or person in charge shall, when so ordered by the harbor master, cause the fasts to be slackened or cast off.

5. Vessels lying at the ends of piers, so as to obstruct the passage to the adjoining docks, must move when necessary to accommodate other vessels entering or leaving the docks.

6. Vessels lying alongside of a wharf and not taking in or discharging cargo, must make way for, and permit other vessels that want to load or unload cargo, to come inside next to the wharf

7. If the person in charge of any vessel refuse to move, the harbor master shall cause the same to be done at the cost and risk of the master, owner, or consignee.

9. No tar, pitch, turpentine, or resin shall be heated on a wharf, or on board any vessel lying at a wharf.

10. Vessels that may increase their width by using ballast logs, pontoons, or devices of the same nature, must move to accommodate other vessels, when so ordered by the harbor master, and shall pay the expenses of other vessels that may be required to move to allow a vessel with the above appliances to get in or out of docks.

11. All sea going vessels at anchor, or when discharging, loading, laying up or being repaired at any wharf in the port of Philadelphia, are required to have and maintain a safe and convenient ladder, gang plank or side steps for the use of persons having business on board such vessels.

12. Any master, captain, or whoever is in charge of a vessel, who shall refuse or neglect to comply with the directions of the harbor master, or whoever shall obstruct his authority, shall be fined in a sum not exceeding one hundred dollars for each and every offense.

QUARANTINE.

Extracts from the Laws of Pennsylvania, 1893. No. 257.

Governor may suspend operations of State quarantine.

Sec. 1. That whenever it shall be shown to the satisfaction of the governor of Pennsylvania that the Government of the United States has established and is maintaining at the Delaware Bay entrance to the port of Philadelphia, an effective and sufficient quarantine * * * * it shall be lawful for the governor, and he is hereby empowered, to suspend by public proclamation the operation of the State quarantine, in part or in whole in his discretion, as he shall deem is best for the public health and safety.

Sec. 6. Whenever the State quarantine service shall be suspended by the governor in accordance with the provisions of this act, the master of every vessel arriving from a port without this commonwealth, excepting ports on the Delaware river and bay above Reedy Island, shall within twenty-four hours after the arrival of his vessel appear at the quarantine office in the city of Philadelphia, and shall make an affidavit, under oath or affirmation to be administered by the said health officer * * * setting forth the name of his vessel, the port from which he has sailed, that a certificate of health has been granted to him by the officers in charge of the federal quarantine station, and that the same has been deposited with the collector of the port, in compliance with the regulations of the federal authorities * * *. Failure to report his vessel will subject the vessel to a fine of two hundred and fifty dollars * * * the quarantine physician may order such vessel back to said federal quarantine station for further inspection and treatment. * * * said captain or master shall pay to the health officer or the person in charge of said quarantine office a fee according to the following rates:

Proceedings when governor shall suspend the State quarantine service.

Any steam vessel arriving from a foreign port, * * * ten dollars.

Any sailing vessel arriving from a foreign port, * * * five dollars.

Any coasting vessel, sail or steam, arriving from a port south of Saint Mary River, * * * two dollars and fifty cents.

Sec. 12. For the purpose of this act, and of the act to which this is a supplement, the port of Philadelphia shall include all the counties that abut upon the navigable waters of the Delaware River and the navigable tributaries thereof within this Commonwealth.

Territory to be included in the port of Philadelphia.

See also the heading "National Quarantine."

DELAWARE.

NOTE.—The pilot laws and rates of pilotage for the State of Delaware are practically the same as for the State of Pennsylvania.† The following are exceptions:

Extracts from the Public Acts of Delaware, 1881.

Sec. 6. * * * Any pilot bringing in an inward-bound ship or vessel shall by himself or one of his boats' company, be entitled to pilot said ship or vessel to sea when she next leaves the port; and if the master of such ship or vessel shall refuse or neglect to take such pilot, the master, owner or consignee of such ship or vessel shall forfeit and pay to such pilot sueing for the same, a sum equal to the pilotage of such ship or vessel, * * *

Pilot of inward-bound vessel entitled to pilot to sea.

Sec. 7. That it shall be the duty of every master or commander of a ship or vessel outward bound, and he is hereby required to remain six hours after his arrival at the Capes, to give the pilot on board such ship or vessel an opportunity to be taken out, and if the master or commander of such ship or vessel refuses so to do, and if the same can be done without endangering the vessel aforesaid, the master, owner, or consignee of such ship or vessel shall forfeit and pay to such pilot, his executors or administrators, any sum not exceeding eight hundred dollars. * * * * *

Outward-bound vessels to remain at Capes six hours for pilot to be taken off.

Sec. 8. That if it shall so happen that any first-rate pilot, having a boat attending him, shall be carried to sea in any ship or vessel contrary to his inclinations, by stress of weather or other unavoidable accident, the master, owner, or consignee of such ship or vessel shall pay to such pilot, his executors or administrators, the same wages as the master of said vessel receives until the return of said pilot to said Capes.

Pilot carried to sea.

*Extracts from "A Supplement * *" passed April 13, 1887.*

Sec. 1. That no master or commander of a steam tugboat shall undertake to tow any inward-bound vessel required or liable to take a pilot by the act to which this is a supplement, beyond a line, the Brandywine Lighthouse bearing east (unless such vessel has a pilot on board) without lying by for five hours, at the Delaware breakwater, to give an opportunity for a pilot to offer.

Unlawful for tugboat to tow vessel without pilot.

Sec. 2. Any master or commander of a steam tugboat, or any person in charge of the same, who violates the foregoing section shall be treated and regarded as piloting without a license, and, together with the owner or owners thereof, shall become liable to and pay for the uses of the Board of Pilot Commissioners * * * a sum equal to the regular pilotage * * * had such inward-bound vessel taken a pilot.

Penalty.

† See table, rates of pilotage on page 99.

APPENDIX II.

WIND SIGNALS OF THE U. S. WEATHER BUREAU.

STORM AND INFORMATION SIGNALS ALONG THE SEACOAST.

A red flag with a black center indicates that the storm is expected to be of marked violence.

The pennants displayed with the flags indicate the direction of the wind; red, easterly (from northeast to south); white, westerly (from southwest to north). The pennant above the flag indicates that the wind is expected to blow from the northerly quadrant; below, from the southerly quadrant.

STORM SIGNALS.

Northwesterly winds.

Southwesterly winds.

Northeasterly winds.

Southeasterly winds.

By night a red light will indicate easterly winds and a white light above a red light will indicate westerly winds.

The "**Information Signal**" consists of a red pennant of the same dimensions as the red and the white pennants (direction signals) and when displayed indicates that the local observer has received information from the central office of a storm covering a limited area, dangerous only for vessels about to sail to certain points. The signal will serve as a notification to shipmasters that the necessary information will be given them upon application to the local observer.

Hurricane.

The "**Hurricane Signal**" denotes the expected approach of a hurricane or of one of the severe and dangerous storms that occasionally moves across the Gulf of Mexico and along the Atlantic Coast.

APPENDIX III.

REGULATIONS U. S. MARINE-HOSPITAL SERVICE.

APPROVED NOVEMBER 27, 1897.

(*Extracts.*)

GENERAL DUTIES OF COMMISSIONED OFFICERS.

PROFESSIONAL DUTIES.

Professional duties defined.

111. The professional duties of commissioned officers are to examine all applicants for relief, to prescribe for and furnish out-patient or hospital treatment as may be required, and to make physical examinations of the seamen of the several Government services and the merchant marine, under such regulations as shall hereinafter appear.

To examine seamen, cadets, enlisted men, etc., as to their physical condition.

112. Commissioned officers will, upon the application of the United States shipping commissioner, or of the master or owner of any United States vessel engaged in the foreign, coastwise, or inland navigation trade, examine as to his physical condition any seaman brought to them for that purpose, and will give a certificate (Form 1928) as to his fitness or unfitness for service. They will physically examine, in accordance with existing regulations governing physical examinations, any foreign seamen sent them for that purpose by the duly authorized agent of a foreign line, or by the consul representing the nation to which the vessel belongs. A fee of $1 will be charged for each examination of a foreign seaman, and fees so received will be deposited with the collector of customs in the same manner as donations to the marine-hospital fund. Officers will also, upon the application of the proper authority, examine cadets, enlisted men, and persons desiring to enlist in the Revenue-Cutter, Life-Saving, Coast-Survey, and Light-House services, or to instruct them in the mode of resuscitating persons apparently drowned. No fee will be charged for this service. They will also examine alien immigrants when detailed for that purpose.

To examine applicants for pilot's license.

113. Whenever officially requested by the local inspectors of steam vessels or other proper officers, commissioned officers will examine applicants for pilot's license as to sense of hearing, color perception, and general visual capacity, and will give a certificate accordingly.

No fee to be charged.

114. No fee will be charged by any officer of the Marine-Hospital Service for the medical examination of seamen of the United States merchant marine or for making a certificate as to their physical condition.

SANITARY DUTIES.

To enforce national quarantine rules and regulations. Apr. 29, 1878, s. 3; Feb. 15, 1893.

117. It shall be the duty of commissioned officers to enforce the national quarantine rules and regulations; but no additional compensation shall be allowed said officers by reason of such service as they may be required to perform except actual and necessary traveling expenses.

To vaccinate seamen.

121. Upon the outbreak of smallpox at or near a relief station, commissioned officers will vaccinate such seamen as may come to the marine-hospital office for the purpose; and officers are authorized, at all times, to visit vessels to examine and vaccinate crews.

RELIEF STATIONS.

Definition.

353. A relief station of the Marine-Hospital Service is a port situated on any navigable water of the United States where an officer of the Marine-Hospital Service is on duty to extend relief to seamen or where an officer of the customs service is specifically authorized to extend said relief.

Classes.

354. Relief stations shall be divided into the following classes:

Class I. United States marine hospitals.

Class II. All other stations under command of a commissioned officer.

Class III. All stations under charge of an acting assistant surgeon where there is a contract for the care of sick and disabled seamen.

Class IV. All other relief stations not included in the above classes.

Provisions for relief.

355. At all relief stations where the number of patients warrants, an officer the Marine-Hospital Service will be assigned to the command of the station, and, whenever practicable, the patients of the Service will be treated in hospitals maintained exclusively for their benefit. At places where Congress has made no provision for the erection of a marine hospital, buildings or rooms suitable for hospital purposes, or separate wards in State, municipal, or private hospitals, may be leased or rented, for the exclusive benefit of the patients of the Service, or contracts may be made for the care and treatment of patients with local hospitals, subject to the approval of the Secretary of the Treasury.

Supervision of relief.

356. The medical and surgical treatment of the patients of the Marine-Hospital Service will be under the supervision of the commissioned and non-commissioned officers of the Service, at all relief stations where such officers are on duty, and they will be required to take direct professional charge of the patients.

Provision for marine-hospital dispensaries.

357. At each relief station of the first and second class, and whenever practicable at each relief station of the third class where an acting assistant surgeon of the Marine-Hospital Service is on duty, there shall be a marine-hospital office, where applicants for relief shall be received and examined, and the necessary action taken according to the regulations.

Location of offices and dispensaries.

358. The marine-hospital office shall be located at the custom-house whenever practicable, and suitable office room for that purpose shall be set apart by the custodian of the custom-house building, subject to the approval of the Secretary of the Treasury.

Districts.

359. The relief stations of the Marine-Hospital Service are grouped into eight districts, as follows:

The district of the North Atlantic; the district of the Middle Atlantic; the district of the South Atlantic; the district of the Gulf; the district of the Ohio; the district of the Mississippi; the district of the Great Lakes, and the district of the Pacific.

Middle Atlantic.

361. The district of the Middle Atlantic embraces the following-named relief stations, viz: Albany N. Y.; Bridgeport, Conn.; Delaware Breakwater, Del.; Hartford, Conn.; New Haven, Conn.; New London, Conn.; New York, N. Y.; Perth Amboy, N. J.; Philadelphia, Pa.; Sag Harbor, N. Y.; Somers Point, N. J., and Wilmington, Del.

BENEFICIARIES.

Persons entitled to relief.

368. The persons entitled to the benefits of the Marine-Hospital Service are those employed on board in the care, preservation, or navigation of any registered, enrolled, or licensed vessel of the United States, or in the service on board of those engaged in such care, preservation, or navigation. Officers and crews of the Light House Establishment, officers and crews of the Revenue-Cutter Service, seamen employed on the vessels of the Mississippi River Commission, seamen employed on vessels of the Engineer Corps of the Army, and keepers and crews of the United States Life-Saving Service are entitled to the facilities of the hospitals and relief stations under special rules hereinafter prescribed.

Yachtsmen entitled.

369. Seamen employed on yachts are entitled to treatment, provided the said yachts are enrolled, licensed, or registered as vessels of the United States.

Exceptions, R. S., s. 4804.

370. No person employed in or connected with the navigation, management, or use of canal boats engaged in the coasting trade shall, by reason thereof, be entitled to any benefit or relief from the marine-hospital fund.

Wrecked seamen entitled.

372. Seamen taken from wrecked vessels of the United States are entitled to the benefits of the Marine-Hospital Service if sick or disabled, and will be furnished care and treatment without reference to the length of time they have been employed.

Seamen sent by consular officers entitled. U. S. Rev. Stat., s. 4577.

373. Seamen employed on merchant vessels of the United States returned to the United States from foreign ports by United States consular officers, if sick or disabled at the time of their arrival in a port of the United States, shall be entitled to the benefits of the Marine-Hospital Service without reference to length of service.

374. A sick or disabled seaman, in order to obtain the benefits of the Marine-Hospital Service, must apply in person, or by proxy if too sick or disabled so to do, at the office of the Marine-Hospital Service, to an officer of that Service, or to the proper customs officer acting as the agent of the Marine-Hospital Service at stations where no Marine-Hospital officer is on duty, and must furnish satisfactory evidence that he is entitled to relief under the regulations.

Seamen must make application for relief.

375. Masters certificates and discharges from United States shipping commissioners, made out and signed in proper form, showing that the applicant for relief has been employed for sixty days of continuous service "in a registered, enrolled, or licensed vessel of the United States," a part of which must have been during the sixty days immediately preceding his application for relief, shall entitle him to treatment. The phrase "sixty days continuous service" shall not be held to exclude seamen whose papers show brief intermission between short services that aggregate the required sixty days.

Evidence to be presented by applicant.

U. S. Rev. Stat., 4803.

376. The certificate of the owner or accredited commercial agent of a vessel as to the facts of the employment of any seamen on said vessel may be accepted as evidence in lieu of the master's certificate in cases where the latter is not procurable.

Certificates from owners or agents as evidence.

377. Masters of documented vessels of the United States shall, on demand, furnish any seaman who has been employed on such vessel a certificate (Form 1914) of the length of time said seaman has been so employed, giving the dates of such employment. This certificate will be filed in the marine-hospital office or office of the customs officer, when application is made for relief, whether the relief is furnished or the claim rejected.

Masters must furnish certificate of service.

378. In case the master of any vessel shall fail or refuse to furnish a master's certificate to any seaman who may have been employed on board said vessel within sixty days, the collector of customs shall cause said master, if he be in port, to appear at the marine-hospital office and produce the ship's books.

Masters refusing to give certificate. Secs. 5438 and 5440, R. S.

379. Any master of a vessel or other person who shall furnish a false certificate of service, with intent to procure the admission of a seaman into any marine hospital, shall be immediately reported to the nearest United States attorney for prosecution.

False certificates.

380. When an interval has occurred in the applicant's seafaring service by reason of the closure of navigation on account of ice or low water, such interval shall not be considered as excluding him from relief unless the sickness or injury for which he applies for relief be the direct result of employment on shore.

Exceptions.

381. During the season when navigation is closed at any port by reason of ice or low water, seamen applying for relief at such ports shall be entitled to same, provided they present the documentary evidence required in paragraph 375, which must show that the applicants were employed within sixty days immediately preceding the said closure of navigation, and it must be satisfactorily shown that the disease or injury was also acquired during the time of their service.

Closure of navigation.

382. The time during which a seaman has been under treatment in hospital as a patient of the Marine-Hospital Service shall not be reckoned as absence from vessel in respect to debarring him from further relief.

Period of treatment not to be reckoned as absence from vessel.

383. Whenever an applicant for relief presents himself at the marine-hospital office or the custom-house without a master's certificate or shipping commissioner's discharge and it is impracticable to obtain such certificate on account of the absence of the vessel or its master from the port, the affidavit of the applicant as to the facts of his last employment, stating names of vessels and dates of service, may be accepted as evidence in support of his claim for the benefits of the Marine-Hospital Service.

Affidavits may be accepted as evidence.

384. When the period of the seaman's service as shown by his certificate on last vessel in less than 60 days, his affidavit as to previous service may be accepted if supported by satisfactory evidence.

Brief service on last vessel not a bar to relief.

387. When a seaman applies for relief after an absence of sixty days or more from his last vessel, and it satisfactorily appears that such absence was due to sickness or injury acquired in the line of duty, and that it was impracticable for him to apply to the proper officer for treatment, a statement of the facts, together with a copy of the application and other papers in support of same, shall be forwarded to the Supervising Surgeon-General for decision.

Applications for relief after sixty days' absence from vessel.

388. Any seaman who is able to write will be expected to sign his name upon the face of the master's certificate issued to him before said certificate is signed by the master of the vessel. * * *

Seaman to sign certificates.

Out-patients to furnish new service certificates.

390. When a seaman who has received continuous treatment at the out-patient office for a period of two months applies for further treatment, he must, to entitle him to treatment, furnish a new certificate of service showing that he is still following his vocation as seaman.

Expenses for sickness during voyage.

391. The expenses of caring for sick and disabled seamen incurred during a voyage will not be paid by the Marine-Hospital Service.

Seamen admitted to local quarantine hospitals.

392. The expenses for the care and treatment of seamen suffering from contagious diseases entitled to the benefits of the Marine-Hospital Service, who, in accordance with the State or municipal health laws and regulations, are taken to quarantine or other hospitals under charge of the local health authorities, will not be paid from the Marine-Hospital fund unless such seamen were admitted at the time by the request of an officer of the Service.

Money not to be paid to seamen for expenses of sickness.

393. In no case shall money be paid to a seaman or to his family or friends by the Marine-Hospital Service as reimbursement for expenses incurred during sickness or disability.

Seamen injured in brawls not to receive treatment.

395. Seamen who may be injured during street brawls or while committing a breach of the peace, and are therefore confined in jail or taken to civil hospitals by the local authorities for such acts, shall not receive treatment at the expense of the Marine-Hospital fund.

Seamen taken ill on vessel entitled.

396. Seamen taken seriously sick or injured while actually employed on a documented vessel shall be entitled to treatment at relief stations without reference to the length of their service.

Certificates of discharge.

397. A certificate of discharge may, at the discretion of the officer in charge of the case, be given to a hospital patient, but such certificate when presented at another relief station shall not be taken as sufficient evidence of the applicant's title to marine-hospital relief, but may be considered as collateral to other satisfactory data submitted by the seaman.

Only temporary relief contemplated.

398. Temporary relief only is contemplated and admission to hospital is not intended to permit an indefinite residence therin for cause other than actual disease or injury.

RELIEF.

OUT-PATIENT RELIEF.

Cases to be treated as out-patients.

399. Sick and disabled seamen entitled under these regulations to the benefits of the Marine-Hospital Service whose diseases or injuries are of such a nature that they can properly be relieved by medicines, dressings, or advice, without admission to hospital, shall be treated as out-patients, and furnished medicines, dressings, surgical appliances, or advice, as the case may require.

No relief furnished at homes of patients.

400. Seamen will not be furnished relief at their own homes, except by special authority from the Supervising Surgeon-General, and then only an allowance for medical attendance and medicines will be made at the rates fixed by the Treasury Department.

HOSPITAL RELIEF.

Cases for hospital treatment.

413. A sick or disabled seaman entitled to the benefits of the Marine-Hospital Service shall be admitted to hospital only in cases where the gravity of the disease or injury from which he suffers is such as to require hospital treatment in the opinion of an officer of the Service, or of a reputable physician designated by the Department to act at a place where no officer is stationed.

STATIONS OF THE FIRST CLASS.

To be valid only for day of issue.

416. A bed ticket (Form 1917) shall be prepared and delivered to the applicant for relief in a sealed envelope, addressed to the officer or other person authorized to receive the patient. The seaman should at the same time be informed that, unless presented on the day it is issued, the ticket will be invalid.

STATIONS OF THE SECOND CLASS.

To be valid only for day of issue.

424. A bed ticket (Form 1917) shall be prepared and delivered to the applicant for relief in a sealed envelope, addressed to the officer or other person authorized to receive the patient. The seaman should at the same time be informed that, unless presented on the day it is issued, the ticket will be invalid.

STATIONS OF THE THIRD CLASS.

Permits for hospital relief. Form 1916.

432. Customs officers, or acting assistant surgeons when in charge of the station by special authority of the Bureau, shall issue hospital permits for the care and treatment of such applicants as may be found to be entitled to the benefits of the Service and require hospital treatment. The period for which treatment is authorized by the permit should be based upon the certificate of the acting assistant surgeon or attending physician, as given in the relief certificates, but should in no case exceed twenty days.

STATIONS OF THE FOURTH CLASS.

Permits for hospital relief, Form 1916.

445. Customs officers, or acting assistant surgeons when in charge of the station by special authority of the Bureau, shall issue hospital permits for the care and treatment of such applicants as may be found to be entitled to the benefits of the Service and require hospital treatment. The period for which treatment is authorized by the permit should be based upon the certificate of the acting assistant surgeon or attending physician, as given in the relief certificates, but should in no case exceed twenty days.

Permits valid only on day of issue.

448. The hospital permit, before being delivered to the applicant for relief, must be inclosed in an envelope, sealed, and addressed to the person authorized to receive the patient. The seaman should at the same time be informed that unless presented on the day it is issued the permit will be invalid.

Not more than two visits allowed.

410. Out-patient relief will not be furnished except in cases of emergency, such as acute illness or injury, requiring not more than one or two visits.

Foreign seamen et al. not treated.

412. Foreign seamen or employees of the various Government services, not beneficiaries, shall not be treated.

INSANE SEAMEN.

Relief for insane seamen. Mar. 3, 1875.

462. Insane seamen entitled to the benefits of the Marine-Hospital Service may be admitted to the Government Hospital for the Insane, Washington, D. C., upon the order of the Secretary of the Treasury.

DECEASED SEAMEN.

Relatives to be notified.

468. On the death of a patient while under the charge of the Marine-Hospital Service, notice to receive his effects shall be given by letter, or otherwise, to his nearest known relative. * * *

Burial expenses.

469. The necessary expenses of a plain burial for deceased patients of the Service will be paid; but no part of the expenses of the burial of any deceased seaman will be paid for at the expense of the Marine-Hospital Service, unless said seaman was at the time of his death a patient of the Service. When friends or relatives of a deceased seaman claim the body and assume charge of the funeral arrangements, no part of the expenses of the same will be paid by the Marine-Hospital Service.

SEAMEN OF THE GOVERNMENT SERVICES AND FOREIGN SEAMEN.

UNITED STATES NAVY AND COAST SURVEY.

Officers and seamen of various Government services may be admitted.

470. Officers and seamen employed on vessels of the United States Navy and the Coast Survey may be admitted for care and treatment as patients of the Marine-Hospital Service only upon the written request of their respective commanding officers. Every such admission shall be immediately reported to the Supervising Surgeon-General by the officer in charge of the station, on a daily report (Form 1942) or relief certificate (Form 1915), accompanied by a copy of the request upon which such officer or seaman was admitted. They shall be furnished treatment at stations of the first, second, and third class only. The rate of charge to be made for the care and treatment of the said officers and seamen will be fixed by the Department at the beginning of each fiscal year, and will be announced to officers and others in the annual circular entitled "Contracts for care of seamen." The above class of patients are not subject to the provisions requiring transportation to marine hospitals.

FOREIGN SEAMEN.

Foreign seamen may be treated. Sec. 6, act Mar. 3, 1875; 18 Stat L., 485.

471. The accommodations provided for the care and treatment of the patients of the Marine-Hospital Service are also available to foreign seamen at relief stations of the first, second, and third class upon the application of

the consular officer of the nation under whose flag they are sailing; or upon the application of the masters of the vessels upon which said seamen serve, provided satisfactory written security is given for the payment of the expenses of such care and treatment, at rates fixed annually by the Secretary of the Treasury. When treatment is furnished a foreign seaman, the fact will be immediately reported to the Supervising Surgeon-General, on a daily report (Form 1942) or relief certificate (Form 1915), accompanied by a copy of the application upon which he was admitted.

Bills for care and treatment, Form 1926.

472. A bill (Form 1926) in duplicate must be rendered by the officer of the Marine-Hospital Service in command for the care of each foreign seaman or other seaman admitted (not entitled to treatment free), said bill to be rendered upon the termination of treatment in each case. One copy of this bill shall be delivered to the collector of customs, who shall at once collect the amount; the other copy shall be forwarded by the officer rendering the bill to the Supervising Surgeon-General.

Monthly accounts to be rendered.

473. Customs officers acting as agents of the Marine-Hospital Service shall collect all bills for the care and treatment of seamen of the classes enumerated in paragraphs 470 and 471 when rendered by the proper Marine-Hospital officer, and will render monthly accounts for all moneys collected on account of the care and treatment of such seamen; said accounts to be accompanied by abstracts giving the name and nationality of the patient, date of admission and date of discharge, period of treatment, and amount collected in each case.

Notification of amount of bill.

474. Collectors of customs will notify the commanding officer of the vessel of the class enumerated in paragraphs 470 and 471, upon whose request the seaman was admitted, of the amount of the bill, and when paid will give a receipt therefor. The money will be deposited as a repayment to the Marine-Hospital fund in the manner provided for moneys received for the care of foreign seamen.

Charges for cure and treatment.

475. The rate of charge to be made for the care and treatment of foreign seamen will be fixed by the Department at the beginning of each fiscal year, and will be announced to officers and others in the annual circular entitled "Contracts for care of seamen." Foreign seamen are not subject to the provision of paragraphs 426 and 434 requiring transportation to marine hospitals.

THE REVENUE-CUTTER SERVICE.

Admitted without regard to length of service.

476. The officers and crews of the Revenue-Cutter Service will receive hospital or out-patient treatment, as hereinafter provided, on certificate signed by the commanding officer or executive officer of a revenue cutter, without regard to length of service. The certificate shall contain a description of the applicant for relief. Officers on leave or waiting orders may sign their own certificate.

Admitted to stations of class 1 and to contract hospitals.

477. Any such officer or seaman whose condition absolutely requires treatment in hospital will be admitted to hospitals at stations of the first class and to all contract hospitals enumerated in the annual circular entitled "Contracts for care of seamen," subject to the provisions of the said circular with regard to the transfer of patients from a contract to the nearest marine hospital. No admission to hospital will be granted at any port not mentioned in said circular. At all ports mentioned in the circular, where no specific arrangements for treatment in hospitals are made, the regulations governing admission at fourth-class (emergency) stations will be enforced.

Out-patient treatment—where and how furnished.

478. Out-patient treatment will be furnished at all stations where an officer of the Marine-Hospital Service is on duty. At all other stations out-patient relief will be granted only in case of emergency and under the provisions of the regulations relative to fourth-class (emergency) stations. No out-patient relief will be granted at any station not mentioned in the annual circular entitled "Contracts for care of seamen," and in all other respects the regulations of the Marine-Hospital Service must be complied with.

THE LIGHT-HOUSE SERVICE.

Officers and crews of the Light-House Establishment entitled.

487. Officers and crews of the several vessels belonging to the Light-house Establishment may be admitted to the benefits of the Marine-Hospital Service upon the application of their respective commanding officers. No charge will be made for care and treatment.

THE ENGINEER CORPS, UNITED STATES ARMY.

480. Seamen employed on vessels under the charge of the Engineer Corps of the United States Army shall be admitted to the benefits of the Marine-Hospital Service without charge at stations of the first, second, and third class upon the written request of the commanding officers of said vessels.

Seamen employed on vessels of the Engineer Corps, U. S. A., entitled.

NATIONAL QUARANTINES.

AN ACT granting additional quarantine powers and imposing additional duties upon the Marine Hospital Service.

(*Extracts.*)

[Approved February 15, 1893.]

Be it enacted by the Senate and House of Representatives of the United States of America in Congress assembled, That it shall be unlawful for any merchant ship or other vessel from any foreign port or place to enter any port of the United States, except in accordance with the provisions of this act and with such rules and regulations of State and municipal health authorities as may be made in pursuance of, or consistent with, this act; and any such vessel which shall enter, or attempt to enter, a port of the United States in violation thereof shall forfeit to the United States a sum, to be awarded in the discretion of the court, not exceeding five thousand dollars, which shall be a lien upon said vessel, to be recovered by proceedings in the proper district court of the United States. In all such proceedings the United States district attorney for such district shall appear on behalf of the United States; and all such proceedings shall be conducted in accordance with the rules and laws governing cases of seizure of vessels for violation of the revenue laws of the United States.

SEC. 2. That any vessel at any foreign port clearing for any port or place in the United States shall be required to obtain from the consul, vice-consul, or other consular officer of the United States at the port of departure, or from the medical officer, where such officer has been detailed by the President for that purpose, a bill of health, in duplicate, in the form prescribed by the Secretary of the Treasury, setting forth the sanitary history and condition of said vessel, and that it has in all respects complied with the rules and regulations in such cases prescribed for securing the best sanitary condition of the said vessel, its cargo, passengers, and crew; and said consular or medical officer is required, before granting such duplicate bill of health, to be satisfied that the matters and things therein stated are true; and for his services in that behalf he shall be entitled to demand and receive such fees as shall by lawful regulation be allowed, to be accounted for as is required in other cases.

The President, in his discretion, is authorized to detail any medical officer of the Government to serve in the office of the consul at any foreign port for the purpose of furnishing information and making the inspection and giving the bills of health hereinbefore mentioned. Any vessel clearing and sailing from any such port without such bill of health, and entering any port of the United States, shall forfeit to the United States not more than five thousand dollars, the amount to be determined by the court, which shall be a lien on the same, to be recovered by proceedings in the proper district court of the United States. In all such proceedings the United States district attorney for such district shall appear on behalf of the United States; and all such proceedings shall be conducted in accordance with the rules and laws governing cases of seizure of vessels for violation of the revenue laws of the United States.

SEC. 5. That the Secretary of the Treasury shall from time to time issue to the consular officers of the United States and to the medical officer serving at any foreign port, and otherwise make publicly known, the rules and regulations made by him, to be used and complied with by vessels in foreign ports, for securing the best sanitary condition of such vessels, their cargoes, passengers, and crew, before their departure for any port in the United States, and in the course of the voyage; and all such other rules and regulations as shall be observed in the inspection of the same on the arrival thereof at any quarantine station at the port of destination, and for the disinfection and isolation of the same, and the treatment of cargo and persons on board, so as to prevent the introduction of cholera, yellow fever, or other contagious or infectious diseases; and it shall not be lawful for any vessel to enter said port to discharge its cargo, or land its passengers, except upon a certificate of the health officer at such quarantine station certifying that said rules and regulations have in all respects been observed and complied with, as well on his part as on the part of the said vessel and its master, in respect to the same and to its cargo, passengers, and crew; and the master of every such vessel shall produce and deliver to the collector of customs at said port of entry, together with the other papers of the vessel, the said bills of health required to be obtained at the port of departure and the certificate herein required to be obtained from the health officer at the port of entry and that the bills of health herein prescribed shall be considered

as part of the ship's papers, and when duly certified to by the proper consular or other officer of the United States, over his official signature and seal, shall be accepted as evidence of the statements therein contained in any court of the United States.

SEC. 6. That on the arrival of an infected vessel at any port not provided with facilities for treatment of the same, the Secretary of the Treasury may remand said vessel, at its own expense, to the nearest national or other quarantine station, where accommodations and appliances are provided for the necessary disinfection and treatment of the vessel, passengers, and cargo; and after treatment of any infected vessel at a national quarantine station, and after certificate shall have been given by the United States quarantine officer at said station that the vessel, cargo, and passengers are each and all free from infectious disease, or danger of conveying the same, said vessel shall be admitted to entry to any port of the United States named within the certificate. But at any ports where sufficient quarantine provision has been made by State or local authorities the Secretary of the Treasury may direct vessels bound for said ports to undergo quarantine at said State or local station.

SEC. 7. That whenever it shall be shown to the satisfaction of the President, that by reason of the existence of cholera or other infectious or contagious diseases in a foreign country there is serious danger of the introduction of the same into the United States, and that notwithstanding the quarantine defense this danger is so increased by the introduction of persons or property from such country that a suspension of the right to introduce the same is demanded in the interest of the public health, the President shall have power to prohibit, in whole or in part, the introduction of persons and property from such countries or places as he shall designate, and for such period of time as he may deem necessary.

QUARANTINE REGULATIONS TO BE OBSERVED AT PORTS AND ON THE FRONTIERS OF THE UNITED STATES.

(*Extracts.*)

ARTICLE I.—INSPECTION.

1. Vessels arriving at ports of the United States under the following conditions shall be inspected by a quarantine officer prior to entry.

A. Any vessel with sickness on board.

B. All vessels from foreign ports.

C. Vessels from domestic ports where cholera or yellow fever prevails or where smallpox or typus fever prevails in epidemic form.

EXCEPTIONS.—Vessels not carrying passengers on inland waters of the United States. Vessels from the Pacific and Atlantic coasts of British America, provided they do not carry persons or effects of persons nonresident in America for the sixty days next preceding arrival, and provided always that the port of departure be free from quarantinable disease. Vessels from other foreign ports via these excepted ports shall be inspected.

D. Vessels from foreign ports carrying passengers having entered a port of the United States without complete discharge of passengers and cargo. Such vessels shall be subject to a second inspection before entering any other port. Vessels from ports suspected of infection with yellow fever, having entered a port north of the southern boundary of Maryland without disinfection, shall be subjected to a second inspection before entering any port south of said latitude during the quarantine season of such port.

2. The inspections of vessels required by these regulations shall be made by daylight, except in case of vessels in distress.

3. In making the inspection of a vessel, the bill of health and clinical record of all cases treated during the voyage, crew and passengers' lists and manifests, and, when necessary, the ship's log shall be examined. The crew and passengers shall be mustered and examined and compared with the lists and manifests, and any discrepancies investigated.

4. No person except the quarantine officer, his employés, United States customs officers, or agents of the vessel, shall be permitted to board any vessel subject to quarantine inspection, until after the vessel has been inspected by the quarantine officer and given its discharge.

ARTICLE II.—QUARANTINE.

1. For the purpose of these regulations, the quarantinable diseases are cholera (cholerine), yellow fever, smallpox, typus fever, and leprosy.

2. Vessels arriving under the following conditions shall be placed in quarantine:

A. With quarantinable disease on board.

B. Having had such on board during the voyage or within thirty days next preceding arrival; or, if arriving in the quarantine season, having had yellow fever on board after March 1 of the current year, unless satisfactorily disinfected thereafter.

C. From ports infected with cholera, or where typhus fever prevails in epidemic form, coming directly or via another foreign port, or via United States ports, unless they have

complied with the United States quarantine regulations for foreign ports, also vessels from noninfected ports but bringing persons or cargo from places infected with cholera, yellow fever, or where typhus fever prevails in epidemic form, except as subsequently noted.

D. From ports where yellow fever prevails, unless disinfected in accordance with these regulations, and not less than five days have elapsed since such disinfection.

EXCEPTIONS.—The following exceptions may be made to Rules C and D with regard to vessels from ports quarantined against on account of yellow fever:

(1) Vessels arriving during certain seasons of the year, to wit, from November 1 to May 1, may be admitted to entry. (*See Supplement, Art. 38.*)

(2) Vessels bound for ports in the United States north of the southern boundary of Maryland, with good sanitary condition and history, having had no sickness on board at ports of departure en route or on arrival, provided they have been five days from last infected or suspected port, may be allowed entry at port of destination. But if said vessels carry passengers destined for places south of this latitude the baggage of said passengers shall be disinfected.

* * * * * * *

ARTICLE III.—GENERAL REQUIREMENTS AT QUARANTINES.

1. Pilots bringing infected vessels will be detained in quarantine a sufficient time to cover the period of incubation of the disease for which the vessel is quarantined, if, in the opinion of the quarantine officer, such pilots have been exposed to infection. The dunnage of pilots shall be disinfected when necessary.

2. No direct communication shall be allowed between quarantine, or any vessel in quarantine, and any person or place outside, and no communication except under the supervision of the quarantine officer.

3. No ballast shall be allowed to leave the quarantine station unless disinfected.

4. Where it is impossible to disinfect cargo *in situ*, it shall be removed and disinfected in the manner provided for articles of their class in these regulations; such articles to be unpacked and so arranged as to allow the disinfectant used to reach every part of all surfaces of said articles.

5. Vessels arriving at any port of the United States, having cholera or yellow fever aboard during the quarantine season, shall be remanded to an anchorage set apart for infected vessels, and there to remain until after the discharge of the passengers and purification of the vessel.

6. All passenger baggage disinfected under the requirements of these regulations shall be labeled.

APPENDIX IV.

RULES TO PREVENT COLLISIONS OF VESSELS.

Compiled for insertion in volumes of the U. S. Coast Pilot, Atlantic Coast.

AN ACT in regard to collision at sea.

Be it enacted by the Senate and House of Representatives of the United States of America in Congress assembled, That in every case of collision between two vessels it shall be the duty of the master or person in charge of each vessel, if and so far as he can do so without serious danger to his own vessel, crew, and passengers (if any), to stay by the other vessel until he has ascertained that she has no need of further assistance, and to render to the other vessel, her master, crew, and passengers (if any), such assistance as may be practicable and as may be necessary in order to save them from any danger caused by the collision, and also to give to the master or person in charge of the other vessel the name of his own vessel and her port of registry, or the port or place to which she belongs, and also the names of the ports and places from which and to which she is bound. If he fails so to do, and no reasonable cause for such failure is shown, the collision shall, in the absence of proof to the contrary, be deemed to have been caused by his wrongful act, neglect, or default.

SEC. 2. That every master or person in charge of a United States vessel who fails, without reasonable cause, to render such assistance or give such information as aforesaid shall be deemed guilty of a misdemeanor, and shall be liable to a penalty of one thousand dollars, or imprisonment for a term not exceeding two years; and for the above sum the vessel shall be liable and may be seized and proceeded against by process in any district court of the United States by any person; one-half such sum to be payable to the informer and the other half to the United States.

SEC. 3. That this act shall take effect at a time to be fixed by the President by Proclamation issued for that purpose.

Approved, September 4, 1890. Proclamation dated November 18, 1890, to take effect December 15, 1890.

INTERNATIONAL RULES.

I.—ENACTING CLAUSE, AND SCOPE.

Be it enacted by the Senate and House of Representatives of the United States of America in Congress assembled, That the following regulations for preventing collisions at sea shall be followed by all public and private vessels of the United States upon the high seas and in all waters connected therewith, navigable by sea-going vessels.

ART. 30. Nothing in these rules shall interfere with the operation of a special rule, duly made by local authority, relative to the navigation of any harbor, river, or inland waters.

PRELIMINARY DEFINITIONS.

In the following rules every steam-vessel which is under sail and not under steam is to be considered a sailing-vessel, and every vessel under steam, whether under sail or not, is to be considered a steam-vessel.

The word "steam-vessel" shall include any vessel propelled by machinery.

A vessel is "under way" within the meaning of these rules when she is not at anchor, or made fast to the shore, or aground.

II.—LIGHTS AND SO FORTH.

The word "visible" in these rules when applied to lights shall mean visible on a dark night with a clear atmosphere.

ART. 1. The rules concerning lights shall be complied with in all weathers from sunset to sunrise, and during such time no other lights which may be mistaken for the prescribed lights shall be exhibited.

STEAM VESSELS—MASTHEAD LIGHT.

ART. 2. A steam-vessel when under way shall carry—(*a*) On or in front of the foremast, or if a vessel without a foremast, then in the fore part of the vessel, at a height above the hull of not less than twenty feet, and if the breadth of the vessel exceeds twenty feet, then at a height above the hull not less than such breadth, so, however, that the light need not be carried at a greater height above the hull than forty feet, a bright white light, so constructed as to show an unbroken light over an arc of the horizon of twenty points of the compass, so fixed as to throw the light ten points on each side of the vessel, namely, from right ahead to two points abaft the beam on either side, and of such a character as to be visible at a distance of at least five miles.

STEAM VESSELS—SIDE LIGHTS.

(*b*) On the starboard side a green light so constructed as to show an unbroken light over an arc of the horizon of ten points of the compass, so fixed as to throw the light from right ahead to two points abaft the beam on the starboard side, and of such a character as to be visible at a distance of at least two miles.

(*c*) On the port side a red light so constructed as to show an unbroken light over an arc of the horizon of ten points of the compass, so fixed as to throw the light from right ahead to two points abaft the beam on the port side, and of such a character as to be visible at a distance of at least two miles.

(*d*) The said green and red side-lights shall be fitted with inboard screens projecting at least three feet forward from the light, so as to prevent these lights from being seen across the bow.

STEAM VESSELS—RANGE LIGHTS.

(*e*) A steam-vessel when under way may carry an additional white light similar in construction to the light mentioned in subdivision (*a*). These two lights shall be so placed in line with the keel that one shall be at least fifteen feet higher than the other, and in such a position with reference to each other that the lower light shall be forward of the upper one. The vertical distance between these lights shall be less than the horizontal distance.

STEAM VESSELS WHEN TOWING.

ART. 3. A steam-vessel when towing another vessel shall, in addition to her side-lights, carry two bright white lights in a vertical line one over the other, not less than six feet apart, and when towing more than one vessel shall carry an additional bright white light six feet above or below such light, if the length of the tow measuring from the stern of the towing vessel to the stern of the last vessel towed exceeds six hundred feet. Each of these lights shall be of the same construction and character, and shall be carried in the same position as the white light mentioned in article two (*a*), excepting the additional light, which may be carried at a height of not less than fourteen feet above the hull.

Such steam-vessel may carry a small white light abaft the funnel or aftermast for the vessel towed to steer by, but such light shall not be visible forward of the beam.

SPECIAL LIGHTS.

ART. 4. (*a*) A vessel which from any accident is not under command shall carry at the same height as a white light mentioned in article two (*a*), where they can best be seen, and if a steam-vessel in lieu of that light, two red lights, in a vertical line one over the other, not less than six feet apart, and of such a character as to be visible all around the horizon at a distance of at least two miles; and shall by day carry in a vertical line one over the other, not less than six feet apart, where they can best be seen, two black balls or shapes, each two feet in diameter.

(*b*) A vessel employed in laying or in picking up a telegraph cable shall carry in the same position as the white light mentioned in article two (*a*), and if a steam-vessel in lieu of that light, three lights in a vertical line one over the other not less than six feet apart. The highest and lowest of these lights shall be red, and the middle light shall be white, and they shall be of such a character as to be visible all around the horizon at a distance of at least two miles. By day she shall carry in a vertical line, one over the other, not less than six feet apart, where they can best be seen, three shapes not less than two feet in diameter, of which the highest and lowest shall be globular in shape and red in color, and the middle one diamond in shape and white.

(*c*) The vessels referred to in this article, when not making way through the water, shall not carry the side-lights, but when making way shall carry them.

(*d*) The lights and shapes required to be shown by this article are to be taken by other vessels as signals that the vessel showing them is not under command and can not therefore get out of the way.

These signals are not signals of vessels in distress and requiring assistance. Such signals are contained in article thirty-one.

LIGHTS FOR SAILING VESSELS AND VESSELS IN TOW.

ART. 5. A sailing vessel under way and any vessel being towed shall carry the same lights as are prescribed by article two for a steam-vessel under way, with the exception of the white lights mentioned therein, which they shall never carry.

LIGHTS FOR SMALL VESSELS.

ART. 6. Whenever, as in the case of small vessels under way during bad weather, the green and red side-lights can not be fixed, these lights shall be kept at hand, lighted and ready for use; and shall, on the approach of or to other vessels, be exhibited on their respective sides in sufficient time to prevent collision, in such manner as to make them most visible, and so that the green light shall not be seen on the port side nor the red light on the starboard side, nor, if practicable, more than two points abaft the beam on their respective sides. To make the use of these portable lights more certain and easy, the lanterns containing them shall each be painted outside with the color of the light they respectively contain, and shall be provided with proper screens.

LIGHTS FOR SMALL STEAM AND SAIL VESSELS AND OPEN BOATS.

ART. 7. Steam-vessels of less than forty, and vessels under oars or sails of less than twenty tons gross tonnage, respectively, and rowing boats, when under way, shall not be required to carry the light mentioned in article two (*a*), (*b*), and (*c*), but if they do not carry them they shall be provided with the following lights:

First. Steam-vessels of less than forty tons shall carry—

(*a*) In the fore part of the vessel, or on or in front of the funnel, where it can best be seen, and at a height above the gunwale of not less than nine feet, a bright white light constructed and fixed as prescribed in article two (*a*), and of such a character as to be visible at a distance of at least two miles.

(*b*) Green and red side-lights constructed and fixed as prescribed in article two (*b*) and (*c*), and of such a character as to be visible at a distance of at least one mile, or a combined lantern showing a green light and a red light from right ahead to two points abaft the beam on their respective sides. Such lanterns shall be carried not less than three feet below the white light.

Second. Small steamboats, such as are carried by seagoing vessels, may carry the white light at a less height than nine feet above the gunwale, but it shall be carried above the combined lantern mentioned in subdivision one (*b*).

Third. Vessels under oars or sails of less than twenty tons shall have ready at hand a lantern with a green glass on one side and a red glass on the other, which, on the approach of or to other vessels, shall be exhibited in sufficient time to prevent collision, so that the green light shall not be seen on the port side nor the red light on the starboard side.

Fourth. Rowing boats, whether under oars or sail, shall have ready at hand a lantern showing a white light which shall be temporarily exhibited in sufficient time to prevent collision.

The vessels referred to in this article shall not be obliged to carry the lights prescribed by article four (*a*) and article eleven, last paragraph.

LIGHTS FOR PILOT VESSELS.

ART. 8. Pilot-vessels when engaged on their station on pilotage duty shall not show the lights required for other vessels, but shall carry a white light at the masthead, visible all around the horizon, and shall also exhibit a flare-up light or flare-up lights at short intervals, which shall never exceed fifteen minutes.

On the near approach of or to other vessels they shall have their side-lights lighted, ready for use, and shall flash or show them at short intervals, to indicate the direction in which they are heading, but the green light shall not be shown on the port side, nor the red light on the starboard side.

A pilot-vessel of such a class as to be obliged to go alongside of a vessel to put a pilot on board may show the white light instead of carrying it at the masthead, and may, instead of the colored lights above mentioned, have at hand, ready for use, a lantern with a green glass on the one side and a red glass on the other, to be used as prescribed above.

Pilot-vessels when not engaged on their station on pilotage duty shall carry lights similar to those of other vessels of their tonnage. (*See Supplement, Art. 40.*)

LIGHTS, ETC., OF FISHING VESSELS.

ART. 9. [*Article nine, act of August 19, 1890, was repealed by act of May 28, 1894, and article 10, act of March 3, 1885, was reenacted in part by act of August 13, 1894, and is reproduced here in part as article 9. It will be the object of further consideration by the maritime powers:*]

Fishing-vessels of less than twenty tons net registered tonnage, when under way and when not having their nets, trawls, dredges, or lines in the water, shall not be obliged to carry the colored side-lights; but every such vessel shall in lieu thereof have ready at hand a lantern with a green glass on the one side and a red glass on the other side, and on approaching to or being approached by another vessel such lantern shall be exhibited in sufficient time to prevent collision, so that the green light shall not be seen on the port side nor the red light on the starboard side.

The following portion of this article applies only to fishing-vessels and boats when in the sea off the coast of Europe lying north of Cape Finisterre:

(*a*) All fishing-vessels and fishing-boats of twenty tons net registered tonnage or upward, when under way and when not having their nets, trawls, dredges, or lines in the water, shall carry and show the same lights as other vessels under way.

(*b*) All vessels when engaged in fishing with drift nets shall exhibit two white lights from any part of the vessel where they can be best seen. Such lights shall be placed so that the vertical distance between them shall be not less than six feet and not more than ten feet, and so that the horizontal distance between them, measured in a line with the keel of the vessel, shall be not less than five feet and not more than ten feet. The lower of these two lights shall be the more forward, and both of them shall be of such a character and contained in lanterns of such construction as to show all around the horizon, on a dark night, with a clear atmosphere, for a distance of not less than three miles.

(*c*) All vessels when trawling, dredging, or fishing with any kind of drag-nets shall exhibit, from some part of the vessel where they can be best seen, two lights. One of these lights shall be red and the other shall be white. The red light shall be above the white light, and shall be at a vertical distance from it of not less than six feet and not more than twelve feet; and the horizontal distance between them, if any, shall not be more than ten feet. These two lights shall be of such a character and contained in lanterns of such construction as to be visible all around the horizon, on a dark night, with a clear atmosphere, the white light to a distance of not less than three miles and the red light of not less than two miles.

(*d*) A vessel employed in line-fishing, with her lines out, shall carry the same lights as a vessel when engaged in fishing with drift nets.

(*e*) If a vessel when fishing with a trawl, dredge, or any kind of drag-net, becomes stationary in consequence of her gear getting fast to a rock or other obstruction, she shall show the light and make the fog signal for a vessel at anchor.

(*f*) Fishing-vessels may at any time use a flare-up in addition to the lights which they are by this article required to carry and show. All flare-up lights exhibited by a vessel when trawling, dredging, or fishing with any kind of drag-net shall be shown at the after-part of the vessel, excepting that if the vessel is hanging by the stern to her trawl, dredge, or drag-net they shall be exhibited from the bow.

(*g*) Every fishing-vessel when at anchor between sunset and sunrise shall exhibit a white light, visible all around the horizon at a distance of at least one mile.

(*h*) In a fog a drift-net vessel attached to her nets, and a vessel when trawling, dredging, or fishing with any kind of drag-net, and a vessel employed in line-fishing with her lines out, shall, at intervals of not more than two minutes, make a blast with her fog horn and ring her bell alternately.

LIGHTS FOR AN OVERTAKEN VESSEL.

ART. 10. A vessel which is being overtaken by another shall show from her stern to such last-mentioned vessel a white light or a flare-up light.

The white light required to be shown by this article may be fixed and carried in a lantern, but in such case the lantern shall be so constructed, fitted, and screened that it shall throw an unbroken light over an arc of the horizon of twelve points of the compass, namely, for six points from right aft on each side of the vessel, so as to be visible at a distance of at least one mile. Such light shall be carried as nearly as practicable on the same level as the side lights.

ANCHOR LIGHTS.

ART. 11. A vessel under one hundred and fifty feet in length, when at anchor, shall carry forward, where it can best be seen, but at a height not exceeding twenty feet above the hull, a white light in a lantern so constructed as to show a clear, uniform, and unbroken light visible all around the horizon at a distance of at least one mile.

A vessel of one hundred and fifty feet or upward in length, when at anchor, shall carry in the forward part of the vessel, at a height of not less than twenty and not exceeding forty feet above the hull, one such light, and at or near the stern of the vessel, and at such a height that it shall be not less than fifteen feet lower than the forward light, another such light.

The length of a vessel shall be deemed to be the length appearing in her certificate of registry.

A vessel aground in or near a fair-way shall carry the above light or lights and the two red lights prescribed by article four (*a*).

SPECIAL SIGNALS.

ART. 12. Every vessel may, if necessary in order to attract attention, in addition to the lights which she is by these rules required to carry, show a flare-up light or use any detonating signal that can not be mistaken for a distress signal.

NAVAL LIGHTS AND RECOGNITION SIGNALS.

ART. 13. Nothing in these rules shall interfere with the operation of any special rules made by the Government of any nation with respect to additional station and signal-lights for two or more ships of war or for vessels sailing under convoy, or with the exhibition of recognition signals adopted by shipowners, which have been authorized by their respective Governments and duly registered and published.

STEAM VESSEL UNDER SAIL BY DAY.

ART. 14. A steam-vessel proceeding under sail only but having her funnel up, shall carry in daytime, forward, where it can best be seen, one black ball or shape two feet in diameter.

III.—SOUND SIGNALS IN FOG, ETC.

PRELIMINARY.

ART. 15. All signals prescribed by this article for vessels under way shall be given:

First. By "steam-vessels" on the whistle or siren.

Second. By "sailing-vessels" and "vessels towed" on the fog horn.

The words "prolonged blast" used in this article shall mean a blast of from four to six seconds' duration.

A steam-vessel shall be provided with an efficient whistle or siren, sounded by steam or by some substitute for steam, so placed that the sound may not be intercepted by any obstruction, and with an efficient fog horn, to be sounded by mechanical means, and also with an efficient bell. (In all cases where the rules require a bell to be used, a drum may be substituted on board Turkish vessels, or a gong where such articles are used on board small seagoing vessels.) A sailing vessel of twenty tons gross tonnage or upward shall be provided with a similar fog horn and bell.

In fog, mist, falling snow, or heavy rain-storms, whether by day or night, the signals described in this article shall be used as follows, namely:

STEAM VESSEL UNDER WAY.

(*a*) A steam-vessel having way upon her shall sound, at intervals of not more than two minutes, a prolonged blast.

(*b*) A steam-vessel under way, but stopped, and having no way upon her, shall sound, at intervals of not more than two minutes, two prolonged blasts, with an interval of about one second between.

SAIL VESSEL UNDER WAY.

(*c*) A sailing vessel under way shall sound, at intervals of not more than one minute, when on the starboard tack, one blast; when on the port tack, two blasts in succession, and when with the wind abaft the beam, three blasts in succession.

VESSELS AT ANCHOR OR NOT UNDER WAY.

(*d*) A vessel when at anchor shall, at intervals of not more than one minute, ring the bell rapidly for about five seconds.

VESSELS TOWING, ETC.

(*e*) A vessel when towing, a vessel employed in laying or picking up a telegraph cable, and a vessel under way, which is unable to get out of the way of an approaching vessel through being not under command, or unable to maneuver as required by the rules, shall, instead of the signals prescribed in subdivisions (*a*) and (*c*) of this article, at intervals of not more than two minutes, sound three blasts in succession, namely: One prolonged blast followed by short blasts. A vessel towed may give this signal and she shall not give any other.

SMALL SAILING VESSELS AND BOATS.

Sailing vessels and boats of less than twenty tons gross tonnage shall not be obliged to give the above-mentioned signals, but, if they do not, they shall make some other efficient sound signal at intervals of not more than one minute.

SPEED IN FOG.

ART. 16. Every vessel shall, in a fog, mist, falling snow, or heavy rain-storms, go at a moderate speed, having careful regard to the existing circumstances and conditions.

A steam-vessel hearing, apparently forward of her beam, the fog-signal of a vessel, the position of which is not ascertained, shall, so far as the circumstances of the case admit, stop her engines, and then navigate with caution until danger of collision is over.

IV.—STEERING AND SAILING RULES.

PRELIMINARY.

Risk of collision can, when circumstances permit, be ascertained by carefully watching the compass bearing of an approaching vessel. If the bearing does not appreciably change, such risk should be deemed to exist.

SAILING VESSELS.

ART. 17. When two sailing vessels are approaching one another, so as to involve risk of collision, one of them shall keep out of the way of the other, as follows, namely:

(*a*) A vessel which is running free shall keep out of the way of a vessel which is close-hauled.

(*b*) A vessel which is close-hauled on the port tack shall keep out of the way of a vessel which is close-hauled on the starboard tack.

(*c*) When both are running free, with the wind on different sides, the vessel which has the wind on the port side shall keep out of the way of the other.

(*d*) When both are running free, with the wind on the same side, the vessel which is to the windward shall keep out of the way of the vessel which is to the leeward.

(*e*) A vessel which has the wind aft shall keep out of the way of the other vessel.

STEAM VESSELS.

ART. 18. When two steam-vessels are meeting end on, or nearly end on, so as to involve risk of collision, each shall alter her course to starboard, so that each may pass on the port side of the other.

This article only applies to cases where vessels are meeting end on, or nearly end on, in such a manner as to involve risk of collision, and does not apply to two vessels which must, if both keep on their respective courses, pass clear of each other.

The only cases to which it does apply are when each of the two vessels is end on, or nearly end on, to the other; in other words, to cases in which, by day, each vessel sees the masts of the other in a line, or nearly in a line, with her own; and by night, to cases in which each vessel is in such a position as to see both the side-lights of the other.

It does not apply by day to cases in which a vessel sees another ahead crossing her own course; or by night, to cases where the red light of one vessel is opposed to the red light of the other, or where the green light of one vessel is opposed to the green light of the other, or where a red light without a green light, or a green light without a red light, is seen ahead, or where both green and red lights are seen anywhere but ahead.

TWO STEAM VESSELS CROSSING.

ART. 19. When two steam-vessels are crossing, so as to involve risk of collision, the vessel which has the other on her own starboard side shall keep out of the way of the other.

STEAM VESSEL SHALL KEEP OUT OF THE WAY OF SAILING VESSEL.

ART. 20. When a steam-vessel and a sailing vessel are proceeding in such directions as to involve risk of collision, the steam-vessel shall keep out of the way of the sailing vessel.

COURSE AND SPEED.

ART. 21. Where, by any of these rules, one of two vessels is to keep out of the way, the other shall keep her course and speed.

NOTE.—When in consequence of thick weather or other causes, such vessel finds herself so close that collision can not be avoided by the action of the giving-way vessel alone, she also shall take such action as will best aid to avert collision. (See articles twenty-seven and twenty-nine.)

CROSSING AHEAD.

ART. 22. Every vessel which is directed by these rules to keep out of the way of another vessel shall, if the circumstances of the case admit, avoid crossing ahead of the other.

STEAM VESSEL SHALL SLACKEN SPEED OR STOP.

ART. 23. Every steam-vessel which is directed by these rules to keep out of the way of another vessel shall, on approaching her, if necessary, slacken her speed or stop or reverse.

OVERTAKING VESSELS.

ART. 24. Notwithstanding anything contained in these rules every vessel, overtaking any other, shall keep out of the way of the overtaken vessel.

Every vessel coming up with another vessel from any direction more than two points abaft her beam, that is, in such a position, with reference to the vessel which she is overtaking that at night she would be unable to see either of that vessel's side-lights, shall be deemed to be an overtaking vessel; and no subsequent alteration of the bearing between the two vessels shall make the overtaking vessel a crossing vessel within the meaning of these rules, or relieve her of the duty of keeping clear of the overtaken vessel until she is finally past and clear.

As by day the overtaking vessel can not always know with certainty whether she is forward of or abaft this direction from the other vessel, she should, if in doubt, assume that she is an overtaking vessel and keep out of the way.

NARROW CHANNELS.

ART. 25. In narrow channels every steam-vessel shall, when it is safe and practicable, keep to that side of the fair-way or mid-channel which lies on the starboard side of such vessel.

RIGHTS OF WAY OF FISHING VESSELS.

ART. 26. Sailing vessels under way shall keep out of the way of sailing vessels or boats fishing with nets, or lines, or trawls. This rule shall not give to any vessel or boat engaged in fishing the right of obstructing a fair-way used by vessels other than fishing vessels or boats.

GENERAL PRUDENTIAL RULE.

ART. 27. In obeying and construing these rules, due regard shall be had to all dangers of navigation and collision, and to any special circumstances which may render a departure from the above rules necessary in order to avoid immediate danger.

SOUND SIGNALS FOR PASSING STEAMERS.

ART. 28. The words "short blast," used in this article, shall mean a blast of about one second's duration.

When vessels are in sight of one another, a steam-vessel under way, in taking any course authorized or required by these rules, shall indicate that course by the following signals on her whistle or siren, namely:

One short blast to mean, "I am directing my course to starboard."

Two short blasts to mean, "I am directing my course to port."

Three short blasts to mean, "My engines are going at full speed astern."

PRECAUTION.

ART. 29. Nothing in these rules shall exonerate any vessel, or the owner or master or crew thereof, from the consequences of any neglect to carry lights or signals, or of any neglect to keep a proper lookout, or of the neglect of any precaution which may be required by the ordinary practice of seamen, or by the special circumstances of the case.

ART. 30. [See p. 115.]

DISTRESS SIGNALS.

ART. 31. When a vessel is in distress and requires assistance from other vessels or from the shore, the following shall be the signals to be used or displayed by her, either together or separately, namely:

In the daytime—

First. A gun or other explosive signal fired at intervals of about a minute.

Second. The international code signal of distress indicated by N. C.

Third. The distance signal, consisting of a square flag, having either above or below it a ball or anything resembling a ball.

Fourth. A continuous sounding with any fog-signal apparatus.

At night—

First. A gun or other explosive signal fired at intervals of about a minute.

Second. Flames on the vessel (as from a burning tar barrel, oil barrel, and so forth).

Third. Rockets or shells throwing stars of any color or description, fired one at a time, at short intervals.

Fourth. A continuous sounding with any fog-signal apparatus.

INLAND RULES.

NOTE.—*The paragraphs indicated by a vertical line are identically the same as corresponding paragraphs in the International Rules.*

I.—ENACTING CLAUSE AND SCOPE.

Be it enacted by the Senate and House of Representatives of the United States of America in Congress assembled, That the following regulations for preventing collision shall be followed by all vessels navigating all harbors, rivers, and inland waters of the United States, except the Great Lakes and their connecting and tributary waters as far east as Montreal, and the Red River of the North and rivers emptying into the Gulf of Mexico and their tributaries, and are hereby declared special rules duly made by local authority:

ART. 30. The exhibition of any light on board of a vessel of war of the United States or a revenue cutter may be suspended whenever, in the opinion of the Secretary of the Navy, the commander in chief of a squadron, or the commander of a vessel acting singly, the special character of the service may require it.

PRELIMINARY DEFINITIONS.

In the following rules every steam-vessel which is under sail and not under steam is to be considered a sailing-vessel, and every vessel under steam, whether under sail or not, is to be considered a steam-vessel.

The word "steam-vessel" shall include any vessel propelled by machinery.

A vessel is "under way," within the meaning of these rules, when she is not at anchor, or made fast to the shore, or aground.

II.—LIGHTS AND SO FORTH.

The word "visible" in these rules, when applied to lights, shall mean visible on a dark night with a clear atmosphere.

ART. 1. The rules concerning lights shall be complied with in all weathers from sunset to sunrise, and during such time no other lights which may be mistaken for the prescribed lights shall be exhibited.

STEAM VESSELS—MASTHEAD LIGHT.

ART. 2. A steam-vessel when under way shall carry (*a*) on or in front of the foremast, or, if a vessel without a foremast, then in the fore part of the vessel, a bright white light so constructed as to show an unbroken light over an arc of the horizon of twenty points of the compass, so fixed as to throw the light ten points on each side of the vessel, namely, from right ahead to two points abaft the beam on either side, and of such a character as to be visible at a distance of at least five miles.

STEAM VESSELS—SIDE LIGHTS.

(*b*) On the starboard side a green light so constructed as to show an unbroken light over an arc of the horizon of ten points of the compass, so fixed as to throw the light from right ahead to two points abaft the beam on the starboard side, and of such a character as to be visible at a distance of at least two miles.

(*c*) On the port side a red light so constructed as to show an unbroken light over an arc of the horizon of ten points of the compass, so fixed as to throw the light from right ahead to two points abaft the beam on the port side, and of such a character as to be visible at a distance of at least two miles.

(*d*) The said green and red side-lights shall be fitted with inboard screens projecting at least three feet forward from the light, so as to prevent these lights from being seen across the bow.

STEAM VESSELS—RANGE LIGHTS.

(*e*) A sea-going steam-vessel when under way may carry an additional white light similar in construction to the light mentioned in subdivision (*a*). These two lights shall be so placed in line with the keel that one shall be at least fifteen feet higher than the other, and in such a position with reference to each other that the lower light shall be forward of the upper one. The vertical distance between these lights shall be less than the horizontal distance.

(*f*) All steam-vessels (except sea-going vessels and ferry-boats) shall carry in addition to green and red lights required by article two (*b*), (*c*), and screens as required by article two (*d*), a central range of two white lights; the after-light being carried at an elevation at least fifteen feet above the light at the head of the vessel. The head-light shall be so constructed as to show an unbroken light through twenty points of the compass, namely, from right head to two points abaft the beam on either side of the vessel, and the after-light so as to show all around the horizon.

STEAM VESSELS WHEN TOWING.

ART. 3. A steam-vessel when towing another vessel shall, in addition to her side-lights, carry two bright white lights in a vertical line one over the other, not less than three feet apart, and when towing more than one vessel shall carry an additional bright white light three feet above or below such lights, if the length of the tow, measuring from the stern of the towing vessel to the stern of the last vessel towed, exceeds six hundred feet. Each of these lights shall be of the same construction and character, and shall be carried in the same position as the white light mentioned in article two (*a*) or the after range light mentioned in article two (*f*).

Such steam-vessel may carry a small white light abaft the funnel or aftermast for the vessel towed to steer by, but such light shall not be visible forward of the beam.

LIGHTS FOR SAILING VESSELS AND VESSELS IN TOW.

ART. 5. A sailing-vessel under way or being towed shall carry the same lights as are prescribed by article two for a steam-vessel under way, with the exception of the white lights mentioned therein, which they shall never carry.

LIGHTS FOR SMALL VESSELS.

ART. 6. Whenever, as in the case of vessels of less than ten gross tons under way during bad weather, the green and red side-lights can not be fixed, these lights shall be kept at hand, lighted and ready for use; and shall, on the approach of or to other vessels, be exhibited on their respective sides in sufficient time to prevent collision, in such manner as to make them most visible, and so that the green light shall not be seen on the port side nor the red light on the starboard side, nor, if practicable, more than two points abaft the beam on their respective sides. To make the use of these portable lights more certain and easy, the lanterns containing them shall each be painted outside with the color of the light they respectively contain, and shall be provided with proper screens.

LIGHTS FOR ROWING BOATS.

ART. 7. Rowing boats, whether under oars or sail, shall have ready at hand a lantern showing a white light which shall be temporarily exhibited in sufficient time to prevent collision.

LIGHTS FOR PILOT VESSELS.

ART. 8. Pilot-vessels, when engaged on their station on pilotage duty, shall not show the lights required for other vessels, but shall carry a white light at the masthead, visible all around the horizon, and shall also exhibit a flare-up light or flare-up lights at short intervals which shall never exceed fifteen minutes.

On the near approach of or to other vessels they shall have their side-lights lighted, ready for use, and shall flash or show them at short intervals to indicate the direction in which they are heading, but the green light shall not be shown on the port side nor the red light on the starboard side.

A pilot-vessel of such a class as to be obliged to go alongside of a vessel to put a pilot on board may show the white light instead of carrying it at the masthead, and may, instead of the colored lights above mentioned, have at hand ready for use, a lantern with a green glass on the one side and a red glass on the other, to be used as prescribed above.

Pilot vessels, when not engaged on their station on pilotage duty, shall carry lights similar to those of other vessels of their tonnage.

LIGHTS, ETC., OF FISHING VESSELS.

ART. 9. (*a*) Fishing-vessels of less than ten gross tons, when under way and when not having their nets, trawls, dredges, or lines in the water, shall not be obliged to carry the colored side-lights; but every such vessel shall, in lieu thereof, have ready at hand a lantern with a green glass on one side and a red glass on the other side, and on approaching to or being approached by another vessel such lantern shall be exhibited in sufficient time to prevent collision, so that the green light shall not be seen on the port side nor the red light on the starboard side.

(*b*) All fishing-vessels and fishing-boats of ten gross tons or upward, when under way and when not having their nets, trawls, dredges, or lines in the water, shall carry and show the same lights as other vessels under way.

(*c*) All vessels, when trawling, dredging, or fishing with any kind of drag-nets or lines, shall exhibit, from some part of the vessel where they can be best seen, two lights. One of these lights shall be red and the other shall be white. The red light shall be above the white light, and shall be at a vertical distance from it of not less than six feet and not more than twelve feet; and the horizontal distance between them, if any, shall not be more than ten feet. These two lights shall be of such a character and contained in lanterns of such construction as to be visible all around the horizon, the white light a distance of not less than three miles and the red light of not less than two miles.

LIGHTS FOR RAFTS OR OTHER WATER CRAFT.

(*d*) Rafts, or other water craft not herein provided for, navigating by hand power, horse power, or by the current of the river, shall carry one or more good white lights, which shall be placed in such manner as shall be prescribed by the Board of Supervising Inspectors of Steam Vessels. (*See Supplement, Art. 41.*)

LIGHTS FOR AN OVERTAKEN VESSEL.

ART. 10. A vessel which is being overtaken by another, except a steam-vessel with an after range-light showing all around the horizon, shall show from her stern to such last-mentioned vessel a white light or a flare-up light.

ANCHOR LIGHTS.

ART. 11. A vessel under one hundred and fifty feet in length when at anchor shall carry forward, where it can best be seen, but at a height not exceeding twenty feet above the hull, a white light, in a lantern so constructed as to show a clear, uniform, and unbroken light visible all around the horizon at a distance of at least one mile.

A vessel of one hundred and fifty feet or upward in length when at anchor shall carry in the forward part of the vessel, at a height of not less than twenty and not exceeding forty feet above the hull, one such light; and at or near the stern of the vessel, and at such a height that it shall be not less than fifteen feet lower than the forward light, another such light.

The length of a vessel shall be deemed to be the length appearing in her certificate of registry.

SPECIAL SIGNALS.

ART. 12. Every vessel may, if necessary, in order to attract attention, in addition to the lights which she is by these rules required to carry, show a flare-up light or use any detonating signal that can not be mistaken for a distress signal.

NAVAL LIGHTS AND RECOGNITION SIGNALS.

ART. 13. Nothing in these rules shall interfere with the operation of any special rules made by the Government of any nation with respect to additional station and signal lights for two or more ships of war or for vessels sailing under convoy, or with the exhibition of recognition signals adopted by shipowners, which have been authorized by their respective Governments, and duly registered and published.

STEAM VESSEL UNDER SAIL BY DAY.

ART. 14. A steam-vessel proceeding under sail only, but having her funnel up, may carry in daytime, forward, where it can best be seen, one black ball or shape two feet in diameter.

III.—SOUND SIGNALS IN FOG, ETC.

PRELIMINARY.

ART. 15. All signals prescribed by this article for vessels under way shall be given:
1. By "steam-vessels" on the whistle or siren.
2. By "sailing-vessels" and "vessels towed" on the fog horn.
The words "prolonged blast" used in this article shall mean a blast of from four to six seconds' duration.

A steam-vessel shall be provided with an efficient whistle or siren, sounded by steam or by some substitute for steam, so placed that the sound may not be intercepted by any obstruction, and with an efficient fog horn; also with an efficient bell. A sailing-vessel of twenty tons gross tonnage or upward shall be provided with a similar fog horn and bell.

In fog, mist, falling snow, or heavy rain-storms, whether by day or night, the signals described in this article shall be used as follows, namely:

STEAM VESSEL UNDER WAY.

(*a*) A steam-vessel under way shall sound, at intervals of not more than one minute, a prolonged blast.

SAIL VESSEL UNDER WAY.

(*c*) A sailing-vessel under way shall sound, at intervals of not more than one minute, when on the starboard tack, one blast; when on the port tack, two blasts in succession, and when with the wind abaft the beam, three blasts in succession.

VESSELS AT ANCHOR OR NOT UNDER WAY.

(*d*) A vessel when at anchor shall, at intervals of not more than one minute, ring the bell rapidly for about five seconds.

VESSELS TOWING, ETC.

(*e*) A steam-vessel when towing, shall, instead of the signals prescribed in subdivision (*a*) of this article, at intervals of not more than one minute, sound three blasts in succession, namely, one prolonged blast followed by two short blasts. A vessel towed may give this signal and she shall not give any other.

RAFTS OR OTHER WATER CRAFT.

(*f*) All rafts or other water craft, not herein provided for, navigating by hand power, horse power, or by the current of the river, shall sound a blast of the fog horn, or equivalent signal, at intervals of not more than one minute.

SPEED IN FOG.

ART. 16. Every vessel shall, in a fog, mist, falling snow, or heavy rain-storms, go at a moderate speed, having careful regard to the existing circumstances and conditions.

A steam-vessel hearing, apparently forward of her beam, the fog-signal of a vessel, the position of which is not ascertained, shall, so far as the circumstances of the case admit, stop her engines, and then navigate with caution until danger of collison is over.

IV.—STEERING AND SAILING RULES.

PRELIMINARY.

Risk of collison can, when circumstances permit, be ascertained by carefully watching the compass bearing of an approaching vessel. If the bearing does not appreciably change, such risk should be deemed to exist.

SAILING VESSELS.

ART. 17. When two sailing vessels are approaching one another, so as to involve risk of collision, one of them shall keep out of the way of the other as follows, namely:

(*a*) A vessel which is running free shall keep out of the way of a vessel which is close-hauled.

(*b*) A vessel which is close-hauled on the port tack shall keep out of the way of a vessel which is close-hauled on the starboard tack.

(*c*) When both are running free, with the wind on different sides, the vessel which has the wind on the port side shall keep out of the way of the other.

(*d*) When both are running free, with the wind on the same side, the vessel which is to the windward shall keep out of the way of the vessel which is to the leeward.

(*e*) A vessel which has the wind aft shall keep out of the way of the other vessel.

STEAM VESSELS.

ART. 18. RULE I. When steam-vessels are approaching each other head and head, that is, end on, or nearly so, it shall be the duty of each to pass on the port side of the other; and either vessel shall give, as a signal of her intention, one short and distinct blast of her whistle, which the other vessel shall answer promptly by a similar blast of her whistle, and thereupon such vessels shall pass on the port side of each other. But if the courses of such vessels are so far on the starboard of each other as not to be considered as meeting head and head, either vessel shall immediately give two short and distinct blasts of her whistle, which the other vessel shall answer promptly by two similar blasts of her whisle, and they shall pass on the starboard side of each other.

The foregoing only applies to cases where vessels are meeting end on, or nearly end on, in such a manner as to involve risk of collision; in other words, to cases in which, by day, each vessel sees the masts of the other in a line, or nearly in a line, with her own, and by night to cases in which each vessel is in such a position as to see both the side-lights of the other.

It does not apply by day to cases in which a vessel sees another ahead crossing her own course, or by night to cases where the red light of one vessel is opposed to the red light of the other, or where the green light of one vessel is opposed to the green light of the other, or where a red light without a green light or a green light without a red light is seen ahead, or where both green and red lights are seen anywhere but ahead.

RULE III. If, when steam-vessels are approaching each other, either vessel fails to understand the course or intention of the other, from any cause, the vessel so in doubt shall immediately signify the same by giving several short and rapid blasts, not less than four, of the steam-whistle.

RULE V. Whenever a steam-vessel is nearing a short bend or curve in the channel, where, from the height of the banks or other cause, a steam-vessel approaching from the opposite direction can not be seen for a distance of half a mile, such steam-vessel, when she shall have arrived within half a mile of such curve or bend, shall give a signal by one long blast of the steam whistle, which signal shall be answered by a similar blast, given by any approaching steam-vessel that may be within hearing. Should such signal be so answered by a steam-vessel upon the farther side of such bend, then the usual signals for meeting and passing shall immediately be given and answered; but, if the first alarm signal of such vessel be not answered, she is to consider the channel clear and govern herself accordingly.

When steam-vessels are moved from their docks or berths, and other boats are liable to pass from any direction toward them, they shall give the same signal as in the case of vessels meeting at a bend, but immediately after clearing the berths so as to be fully in sight they shall be governed by the steering and sailing rules.

RULE VIII. When steam-vessels are running in the same direction, and the vessel which is astern shall desire to pass on the right or starboard hand of the vessel ahead, she shall give one short blast of the steam-whistle, as a signal of such desire, and if the vessel ahead answers with one blast, she shall put her helm to port; or if she shall desire to pass on the left or port side of the vessel ahead, she shall give two short blasts of the steam-whistle as a signal of such desire, and if the vessel ahead answers with two blasts, shall put her helm to starboard; or if the vessel ahead does not think it safe for the vessel astern to attempt to pass at that point, she shall immediately signify the same by giving several short and rapid blasts of the steam-whistle, not less than four, and under no circumstances shall the vessel astern attempt to pass the vessel ahead until such time as they have reached a point where it can be safely done, when said vessel ahead shall signify her willingness by blowing the proper signals. The vessel ahead shall in no case attempt to cross the bow or crowd upon the course of the passing vessel.

RULE IX. The whistle signals provided in the rules under this article for steam-vessels meeting, passing, or overtaking, are never to be used except when steamers are in sight of each other, and the course and position of each can be determined in the daytime by a sight

of the vessel itself, or by night by seeing its signal lights. In fog, mist, falling snow, or heavy rain-storms, when vessels can not so see each other, fog-signals only must be given.

TWO STEAM VESSELS CROSSING.

ART. 19. When two steam-vessels are crossing, so as to involve risk of collision, the vessel which has the other on her own starboard side shall keep out of the way of the other.

STEAM VESSEL SHALL KEEP OUT OF THE WAY OF SAILING VESSEL.

ART. 20. When a steam-vessel and a sailing-vessel are proceeding in such directions as to involve risk of collision, the steam-vessel shall keep out of the way of the sailing-vessel.

COURSE AND SPEED.

ART. 21. Where, by any of these rules, one of the two vessels is to keep out of the way, the other shall keep her course and speed.

CROSSING AHEAD.

ART. 22. Every vessel which is directed by these rules to keep out of the way of another vessel shall, if the circumstances of the case admit, avoid crossing ahead of the other.

STEAM VESSEL SHALL SLACKEN SPEED OR STOP.

ART. 23. Every steam-vessel which is directed by these rules to keep out of the way of another vessel shall, on approaching her, if necessary, slacken her speed or stop or reverse.

OVERTAKING VESSELS.

ART. 24. Notwithstanding anything contained in these rules, every vessel overtaking any other shall keep out of the way of the overtaken vessel.

Every vessel coming up with another vessel from any direction more than two points abaft her beam, that is, in such a position with reference to the vessel which she is overtaking that at night she would be unable to see either of that vessel's side-lights, shall be deemed to be an overtaking vessel; and no subsequent alteration of the bearing between the two vessels shall make the overtaking vessel a crossing vessel within the meaning of these rules, or relieve her of the duty of keeping clear of the overtaken vessel until she is finally past and clear.

As by day the overtaking vessel can not always know with certainty whether she is forward of or abaft this direction from the other vessel she should, if in doubt, assume that she is an overtaking vessel and keep out of the way.

NARROW CHANNELS.

ART. 25. In narrow channels every steam-vessel shall, when it is safe and practicable, keep to that side of the fair-way or mid-channel which lies on the starboard side of such vessel.

RIGHTS OF WAY OF FISHING VESSELS.

ART. 26. Sailing-vessels under way shall keep out of the way of sailing-vessels or boats fishing with nets, or lines, or trawls. This rule shall not give to any vessel or boat engaged in fishing the right of obstructing a fair-way used by vessels other than fishing-vessels or boats.

GENERAL PRUDENTIAL RULE.

ART. 27. In obeying and construing these rules, due regard shall be had to all dangers of navigation and collision, and to any special circumstances which may render a departure from the above rules necessary in order to avoid immediate danger.

SOUND SIGNALS FOR VESSELS IN SIGHT OF ONE ANOTHER.

ART. 28. When vessels are in sight of one another a steam-vessel under way whose engines are going at full speed astern shall indicate that fact by three short blasts on the whistle.

PRECAUTION.

ART. 29. Nothing in these rules shall exonerate any vessel, or the owner or master or crew thereof, from the consequences of any neglect to carry lights or signals, or of any neglect to keep a proper lookout, or of the neglect of any precaution which may be required by the ordinary practice of seamen, or by the special circumstances of the case.

ART. 30. [See page 122.]

DISTRESS SIGNALS.

ART. 31. When a vessel is in distress and requires assistance from other vessels or from the shore, the following shall be the signals to be used or displayed by her, either together or separately, namely:

In the daytime—

A continuous sounding with any fog-signal apparatus, or firing a gun.

At night—

First. Flames on the vessel, as from a burning tar barrel, oil barrel, and so forth.

Second. A continuous sounding with any fog-signal apparatus, or firing a gun.

ADDITIONAL RULES.

SEC. 2. That the supervising inspectors of steam-vessels and the Supervising Inspector-General shall establish such rules to be observed by steam-vessels in passing each other and as to the lights to be carried by ferry-boats and by barges and canal-boats when in tow of steam-vessels, not inconsistent with the provisions of this Act, as they from time to time may deem necessary for safety, which rules when approved by the Secretary of the Treasury, are hereby declared special rules duly made by local authority, as provided for in article thirty of chapter eight hundred and two of the laws of eighteen hundred and ninety. Two printed copies of such rules shall be furnished to such ferry-boats and steam-vessels, which rules shall be kept posted up in conspicuous places in such vessels.

PENALTY.

SEC. 3. That every pilot, engineer, mate, or master of any steam-vessel, and every master or mate of any barge or canal-boat, who neglects or refuses to observe the provisions of this Act, or the regulations established in pursuance of the preceding section, shall be liable to a penalty of fifty dollars, and for all damages sustained by any passenger in his person or baggage by such neglect or refusal: *Provided*, That nothing herein shall relieve any vessel, owner, or corporation from any liability incurred by reason of such neglect or refusal.

SEC. 4. That every vessel that shall be navigated without complying with the provisions of this Act shall be liable to a penalty of two hundred dollars, one-half to go to the informer, for which sum the vessel so navigated shall be liable, and may be seized and proceeded against by action in any district court of the United States having jurisdiction of the offense.

EXTRACTS FROM TREASURY DEPARTMENT CIRCULAR No. 53 OF 1897.

LINES ESTABLISHING HARBORS, RIVERS, AND INLAND WATERS OF THE UNITED STATES, WITHIN WHICH THE INLAND RULES APPLY.

Pursuant to section 2 of the act approved February 19, 1895, the following lines dividing the high seas from rivers, harbors, and inland waters are hereby designated and defined:

(*Bearings are Magnetic and Given Approximately.*)

CUTLER (LITTLE RIVER) HARBOR, MAINE.—A line drawn from Long Point SW. by W. ¾ W. to Little River Head.

LITTLE MACHIAS BAY, MACHIAS BAY, ENGLISH BAY, CHANDLER BAY, MOOSABEC REACH, PLEASANT BAY, NARRAGUAGUS BAY, AND PIGEON HILL BAY, MAINE.—A line drawn from Little River Head WSW. ¼ W. to the outer side of Old Man; thence WSW. ⅜ W. to the outer side of Double Shot Islands; thence W. ¾ S. to Libby Islands Lighthouse; thence WSW. ¼ W. to Moose Peak Lighthouse; thence WSW. ¼ W. to little Pond Head; from Pond Point, Great Wass Island, W. by S. to outer side of Crumple Island; thence W. ⅜ S. to Petit Manan Lighthouse.

ALL HARBORS ON THE COASTS OF MAINE, NEW HAMPSHIRE, AND MASSACHUSETTS, BETWEEN PETIT MANAN LIGHTHOUSE, MAINE, AND CAPE ANN LIGHTHOUSES, MASSACHUSETTS.—A line drawn from Petit Manan Lighthouse SW. ⅜ S., 26½ miles to Mount Desert Lighthouse; thence W. ⅜ S., 33½ miles, to Matinicus Rock Lighthouses; thence

WNW. $\frac{5}{8}$ W., 20 miles, to Monhegan Island Lighthouse; thence W., 21 miles, to Seguin Island Whistling Buoy; thence W. $\frac{3}{4}$ S., 19 miles, to Old Anthony Whistling Buoy, off Cape Elizabeth; thence SW., 28 miles, to Boon Island Lighthouse; thence SW. $\frac{1}{8}$ W., 12 miles, to Anderson Ledge Spindle, off Isles of Shoals Lighthouse; thence S. by W. $\frac{1}{4}$ W., $19\frac{1}{2}$ miles, to Cape Ann Lighthouses, Massachusetts. (Lines heretofore established for Portland Harbor, and Kittery Harbor, Maine, Portsmouth Harbor, New Hampshire, Newburyport, Ipswich, and Annisquan harbors, Massachusetts, are hereby canceled.)

Boston Harbor.—From Point Allerton NNE. $\frac{1}{4}$ E., easterly through Point Allerton Beacon to Northeast Grave Whistling Buoy; thence NNE. $\frac{1}{4}$ E. to Outer Breaker (Great Pig Rocks) Bell Buoy; thence NE. by E. $\frac{3}{8}$ E. to Halfway Rock Beacon; thence NE. by E. $\frac{1}{4}$ E. to Eastern Point Lighthouse.

All Harbors in Cape Cod Bay, Massachusetts.—A line drawn from Plymouth (Gurnet) Lighthouses E., $16\frac{1}{4}$ miles, to Race Point Lighthouse.

Nantucket Sound, Vineyard Sound, Buzzards Bay, Narragansett Bay, Block Island Sound, and Easterly Entrance to Long Island Sound.—A line drawn from Chatham Lighthouses, Massachusetts, S. by E., $\frac{3}{8}$ E., about 6 miles, to Northeast Slue Channel Whistling Buoy (Pollock Rip); thence S. by W. $\frac{5}{8}$ W., about 11 miles, to Great Round Shoal Light-Vessel; thence SSW. $\frac{5}{8}$ W., $7\frac{5}{8}$ miles to Sankaty Head Lighthouse; from the westerly end of Tuckernuck Island NW. by W. $\frac{1}{2}$ W., about $5\frac{1}{2}$ miles, to Wasque Point, Chappaquiddick Island; from Gay Head Lighthouse W. $\frac{3}{4}$ S., 35 miles, to Block Island (SE.) Lighthouse; thence W. $\frac{3}{4}$ S., 15 miles, to Montauk Point Lighthouse, on the easterly end of Long Island, N. Y.

New York Harbor.—From Navesink (southerly) Lighthouse NE. $\frac{5}{8}$ E., easterly, to Scotland Light-Vessel, thence NNE. $\frac{1}{2}$ E. through Gedney Channel Whistling Buoy (proposed position) to Rockaway Point Life-Saving Station.

Philadelphia Harbor and Delaware Bay.—From Cape Henlopen Light NE. by E. to South Shoal Whistling Buoy, thence NNE. $\frac{1}{4}$ E. to Cape May Light. (*See Supplement, Art. 42.*)

Baltimore Harbor and Chesapeake Bay.—From Cape Henry Lighthouse NE. by E. $\frac{3}{4}$ E., easterly, to Outer Entrance Whistling Buoy, thence N. by E. $\frac{3}{8}$ E. to Cape Charles Lighthouse.

Charleston Harbor.—From Charleston Light-Vessel NW. $\frac{1}{2}$ W. (toward Sullivans Island Range Rear Light) to the North Jetty, and from Charleston Light-Vessel SW. $\frac{1}{8}$ W. to Charleston Whistling Buoy, thence SW. $\frac{7}{8}$ W. to Charleston Main Channel Entrance Bell Buoy, thence W. to Folly Island. (*See Supplement, Art. 43.*)

Savannah Harbor and Calibogue Sound.—From Tybee Whistling Buoy NNW. $\frac{15}{16}$ W. through North Slue Channel Outer Buoy to Braddock Point, Hilton Head Island, and from Tybee Whistling Buoy W. to Tybee Island.

St. Simon Sound (Brunswick Harbor) and St. Andrew Sound.—From hotel on beach of St. Simon Island $\frac{15}{16}$ mile NE. by E. $\frac{1}{4}$ E. from St. Simon Lighthouse, SE. $\frac{7}{8}$ E. to St. Simon Sea Buoy, thence S. $\frac{1}{4}$ E. to St. Andrews Sound Sea Buoy, thence W. to the Shore of Little Cumberland Island.

St. Johns River, Florida.—A straight line from the outer end of the northerly jetty to the outer end of the southerly jetty.

Pensacola Harbor.—From Pensacola Entrance Whistling Buoy N. $\frac{7}{8}$ W., a tangent to the E. side of Fort Pickens, to the shore of Santa Rosa Island, and from the Whistling Buoy NW. $\frac{3}{16}$ W. to Fort McRee Range Front Light.

Mobile Harbor and Bay.—From Mobile Bay Outer or Deep Sea Whistling Buoy (or its watch buoy in summer) NE. by N. to the shore of Mobile Point, and from the Whistling Buoy NW. by W. to the shore of Dauphin Island.

New Orleans Harbor and the Delta of the Mississippi.—From South Pass East Jetty Light N. by E. $\frac{1}{2}$ E. to Pass a Loutre Light, thence N. to Errol Island and from South Pass East Jetty Light W. $\frac{7}{8}$ S. to Southwest Pass Light, thence N. to shore.

Galveston Harbor.—From Galveston Bar Whistling Buoy N. by W. $\frac{3}{4}$ W. through the beacon marking the outer extremity of the N. jetty, and SW. by W. $\frac{1}{2}$ W., westerly, through North Breaker Beacon.

San Diego Harbor.—From Point Loma Light S. $\frac{7}{8}$ E. to San Diego Bay Outside Bar Whistling Buoy, thence NNE. $\frac{7}{8}$ E. to tower of Coronado Hotel.

San Francisco Harbor.—From Point Bonita Lighthouse SE. $\frac{7}{8}$ S. to Point Lobos.

Columbia River Entrance.—From Cape Disappointment Light SE. $\frac{7}{8}$ E. to Point Adams Light.

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